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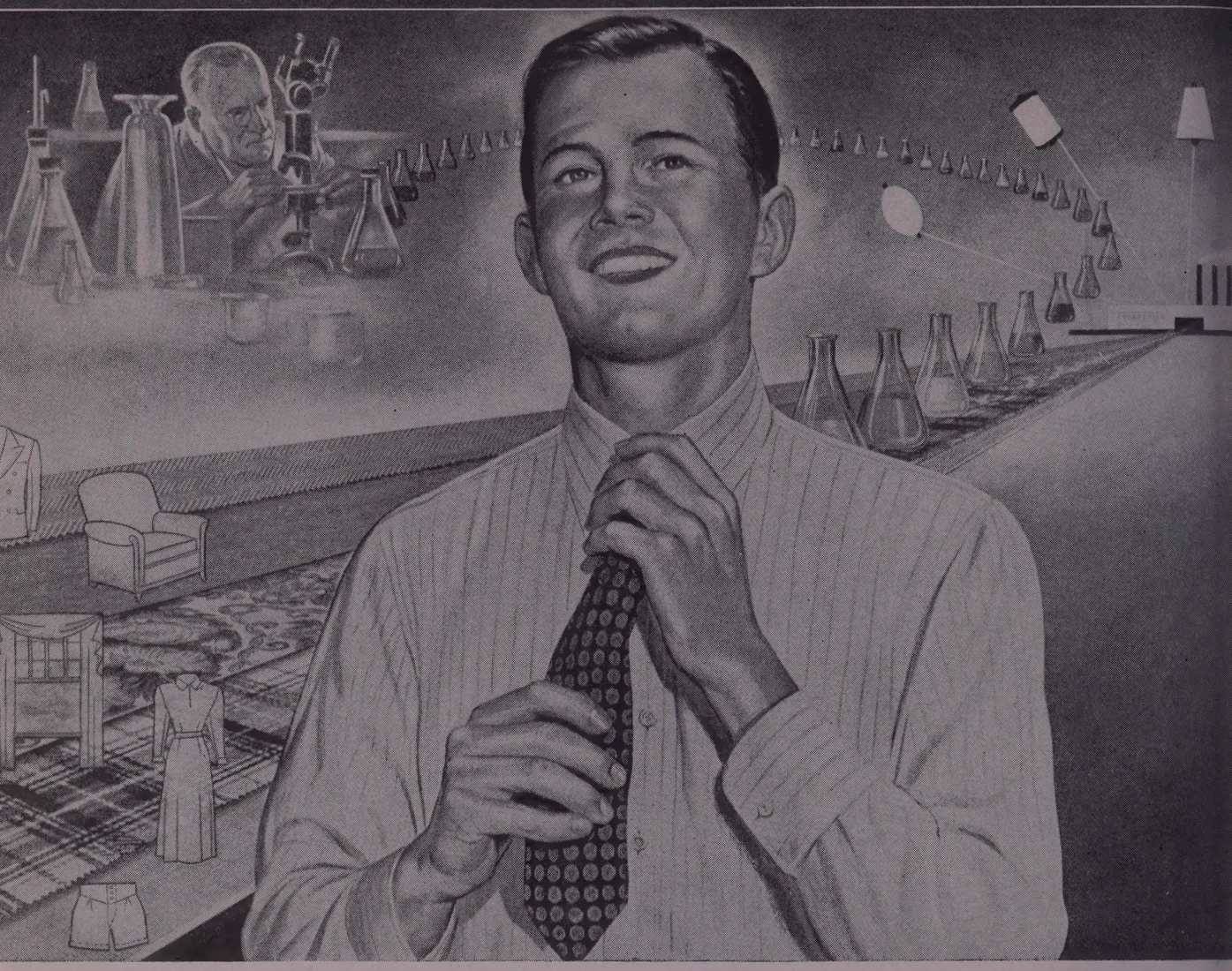
"The outward forms the inward man reveals"—OLIVER WENDELL HOLMES



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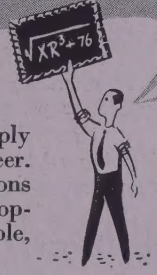

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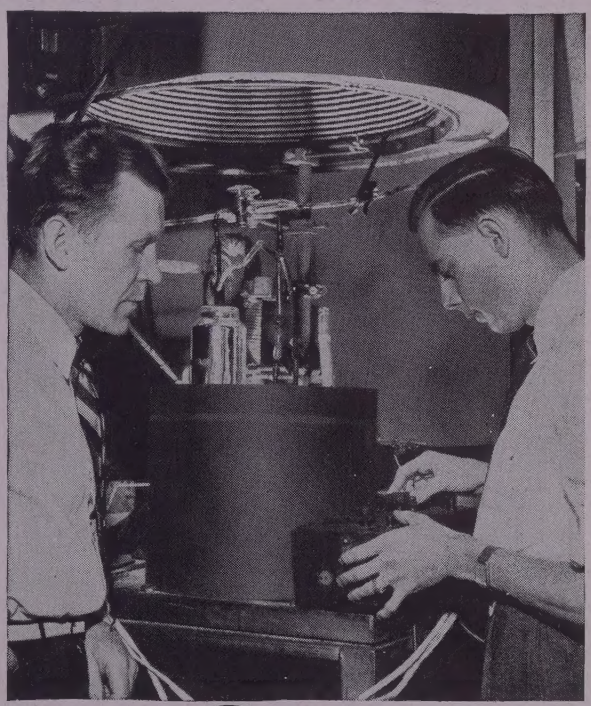

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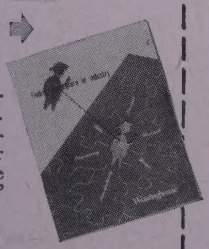

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New Developments

By John Dick, E.E. '49
Herb Mazer, E.E. '50
Ken McOwan, M.E. '49

The Heat Pump

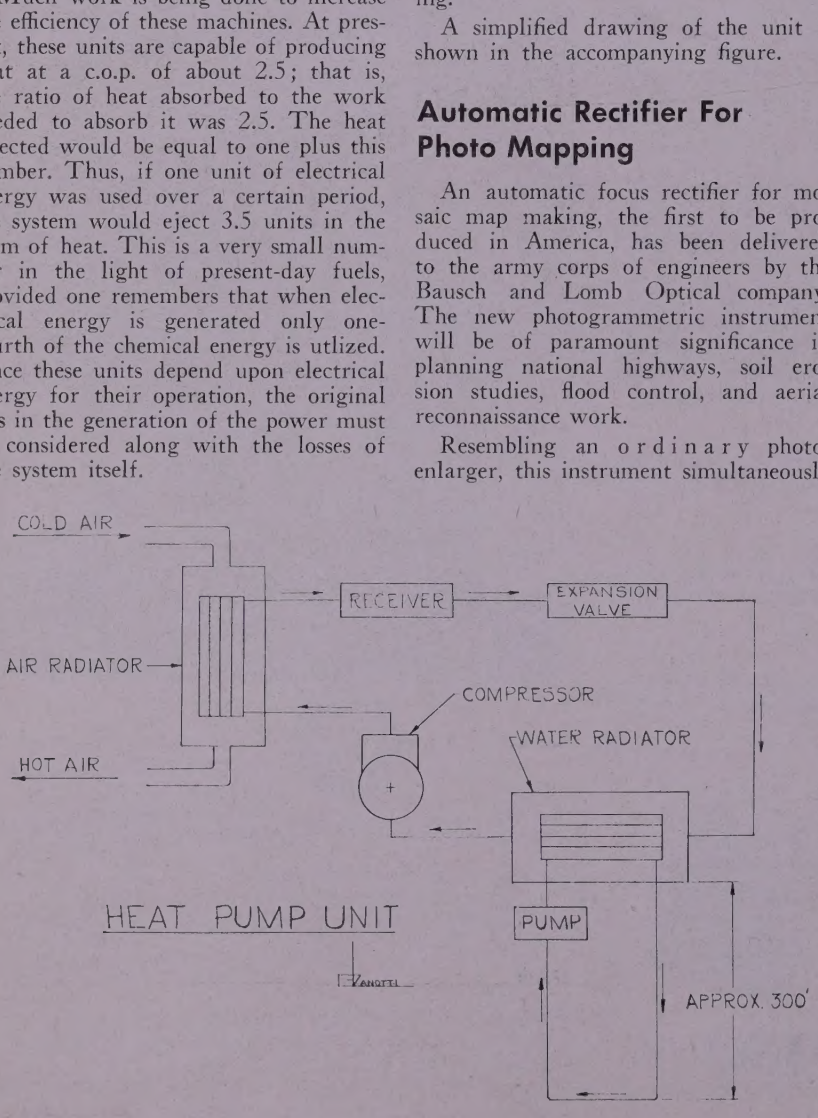
The heat pump is in the public eye today more than ever as a possible source of heat for dwellings. Contrary to the opinion of many, the heat pump or "the Kelvin heating engine" was first conceived in 1852 by Lord Kelvin.

At present this process is being used as a heating and cooling device in a few office buildings. Home use has been impractical up to now because of low efficiency. In the last few years three companies have been experimenting with this process with home use as an objective. Two of these companies are offering ready-built units at present.

Much work is being done to increase the efficiency of these machines. At present, these units are capable of producing heat at a c.o.p. of about 2.5; that is, the ratio of heat absorbed to the work needed to absorb it was 2.5. The heat rejected would be equal to one plus this number. Thus, if one unit of electrical energy was used over a certain period, the system would eject 3.5 units in the form of heat. This is a very small number in the light of present-day fuels, provided one remembers that when electrical energy is generated only one-fourth of the chemical energy is utlized. Since these units depend upon electrical energy for their operation, the original loss in the generation of the power must be considered along with the losses of the system itself.

For operation, these machines utilize the surrounding air for a source of heat in mild climates and the constant temperature below the surface of the earth in the less temperature regions. In the latter case, the unit consists of a long pipe which has water flowing through it, imbedded in the ground to a depth of about 300 feet. The heat from the ground is transferred to the cooler medium of the water in the pipe. The water carries the heat up to the compressor where it is transferred to a still cooler fluid in the compressor. From this point the unit operates like a home refrigerator in reverse. In the summertime, the machine may be reversed to provide cooling.

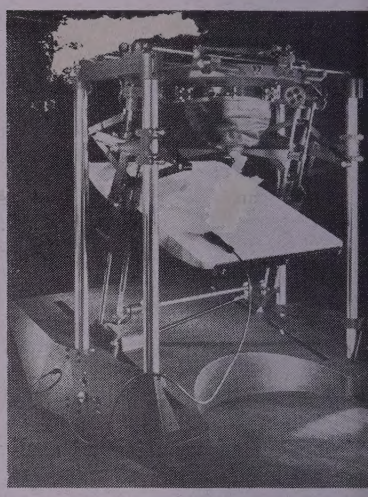
A simplified drawing of the unit is shown in the accompanying figure.



Automatic Rectifier For Photo Mapping

An automatic focus rectifier for mosaic map making, the first to be produced in America, has been delivered to the army corps of engineers by the Bausch and Lomb Optical company. The new photogrammetric instrument will be of paramount significance in planning national highways, soil erosion studies, flood control, and aerial reconnaissance work.

Resembling an ordinary photo-enlarger, this instrument simultaneously



The rectifier corrects distortio in aerial photos

enlarges, prints, and automatically duces aerial photographs to a comm scale and level, correcting the tilt countered as a result of the plane's va tion in angle and level at the time photographs are taken. Planes equip with the most modern stabilizers maintain a constant level only to wit one-quarter degree accuracy, making rectifier vitally necessary in the prod tion of precise aerial photo maps.

The automatic instrument, equip with push button controls, can be op ated by a photographer to turn out tified prints on a production line b at the rate of one every five minu Previous non-automatic rectifiers quired tedious, involved mathemat calculations for each individual pho graph.

Mathematics, mechanical design, many features of the new engineer instrument were worked out by John Sharp and Olin W. Boughton, Bau and Lomb scientists, while optical so tions were contributed by Dr. Konst tin Pestrecov and Harry G. Ott, of the firm's research and engineer staff.

This instrument will be available commercial use this year. It is sm enough to be mounted on a trailer tr for use in field work. It also has flu escent illumination, an enlarging lens high optical resolution, and is constru ed to maintain constantly the pro alignment between the negatives printing easel.

(Continued on Page 38)

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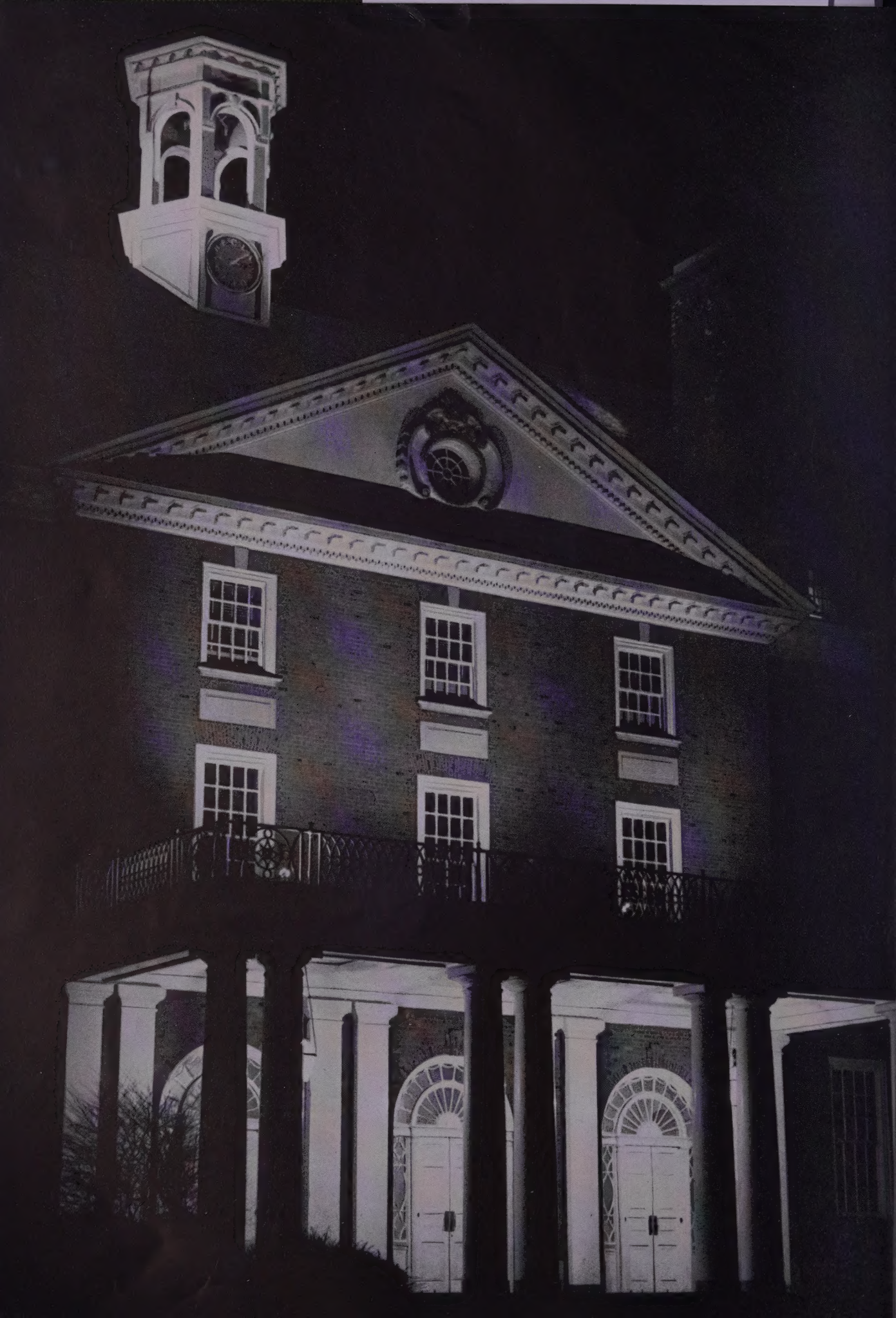
OUR COVER

This night scene of the Illini Union building is typical of what the amateur photographer can do if he sets his mind to it.—(Ted Sohn).

FRONTISPIECE

A scene near White Heath, Illinois, showing the method of contour plowing and terracing to prevent erosion.



In the Dark? . . . See the Light

By Ted Sohn, E. '48

To the majority of camera enthusi-sts their hobby subjects begin and set ith the sun. However, at dusk millions f lights appear one by one to illuminate he scene. Each one renders to nearby bjects a particular kind of glamour that as missing during the day. Whether he downtown shopping district, one's eighborhood, or a college campus, the mplexion of all things is changed. The istracting details that had earlier been noticeable are now hidden in deep ich shadows.

For once, the photographer can ap-roach his subject material with a mini-um of equipment, the rudiments of hich are any camera, a watch with a econd hand, a lens shade, a tripod, and erhaps an exposure meter. Whether or ot it will be possible to use a meter ill depend upon the intensity of illumi-ation. A flashlight is an aid in setting he shutter and diaphram, but it will do ittle better than a few matches. The ripod could be dispensed with provided substitute is used. For exposures of nore than one-fiftieth of a second, it is enerally recommended that the camera e supported solidly instead of held in ne's hands. The lens shade should be onsidered as a necessity since it will minimize the streaks caused by light triking the lens.

The illustrations accompanying this rticle were made on panchromatic film vith exposures ranging from 10 to 120 econds near f-16. This diaphram open-ng represents a compromise between vhat would mean an excessive exposure nd a loss in the depth of focus. Since he depth of focus and to a varying de-gree the clarity of the subject is determined by the diaphram opening, it is to the advantage of the photographer to stop down to at least f-11 or f-16. This increases the length of exposure but the extension of patience in one's endeavors will be rewarded accordingly. Select film for these shots that is fairly fast. Panchromatic films are preferable since they have the greatest latitude and also reduce the exposure considerably. Artificial light consists principally of the longer wave lengths of light, that is, near the red and yellow light bands to which pan film is almost equally sensative.

The real problem in night photography is in exposure. At best, a meter will only duplicate what a good calculated guess would do. To arrive at an exposure, the type of light, film, subject, and so forth must be considered. The exposures appear to have three ranges and the first step is to determine in which one your subject is 10. They are one-tenth to one second, 10 to 30 seconds, and exposures from 45 to 120 seconds, using pan film with the diaphram at f-16. It is best for the beginner to find this range by use of a photographic exposure meter, but if one is not available the exposure selections made by others for similar subjects will have to be used. After some experience has been gained one can rely on this for the so-called calculated guess. At best, there does not seem to be any simple solution for an accurate determination.

Some helpful hints on type of film, time of exposure, lens openings, and other suggestions for night photography are included in this article. Easily accomplished, these suggestions should greatly improve the quality of pictures taken at night by amateur photographers.

Once the range has been selected, either extreme. To illustrate, if the center of the range and two others at either extreme. To illustrate it, the meter indicates an exposure of seventy seconds at f-16, take the first picture at this, and two others at 50 and 90 seconds.

Because films have a limited latitude much smaller than that of human vision, a compromise must be made with every subject. It is not enough that the material being photographed is interesting, but the print must be of high quality. It is difficult to keep all the highlights and still keep some of the objects from becoming hidden in thee shadows. The solution is in selecting that part of the scene most important and exposing for it.

After mastering simple scenes and acquiring a fair degree in the judgment of exposure, a few tricks can be tried. One is a purposeful double exposure which is accomplished by photographing the subject at dusk and again when it is lighted by artificial light. The first time, deliberately underexpose, and lighted, rephotograph it at normal exposure, being sure that the camera is rigidly held so it will not move. The effect is to bring out some of the detail of the building that would ordinarily be lost and at the same time keeping to a minimum the effect of halation. These results can be duplicated in part by using a small flash bulb covered with a handkerchief so that some of the detail can be saved by the supplementary light. Reflection in water puddles or just the fact that it has rained previously will aid in making many pictures additionally interesting, each reflection adding to the effect. This is especially true of wet pavements. It should not be forgotten that under these conditions that a reduction in exposure should be made because of the reflections.

Not all night shots are enhanced by

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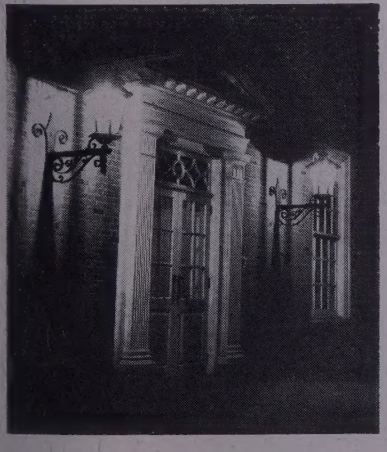
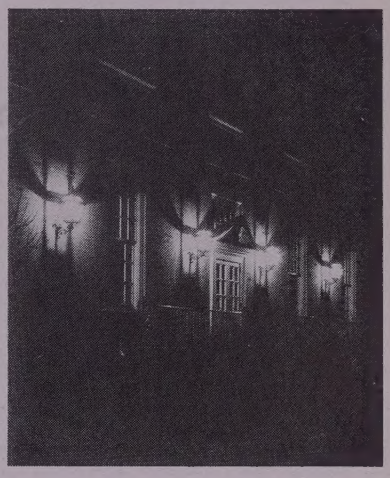


Side entrance of Union building



Terrace entrance of Union building

Argonne National Laboratories

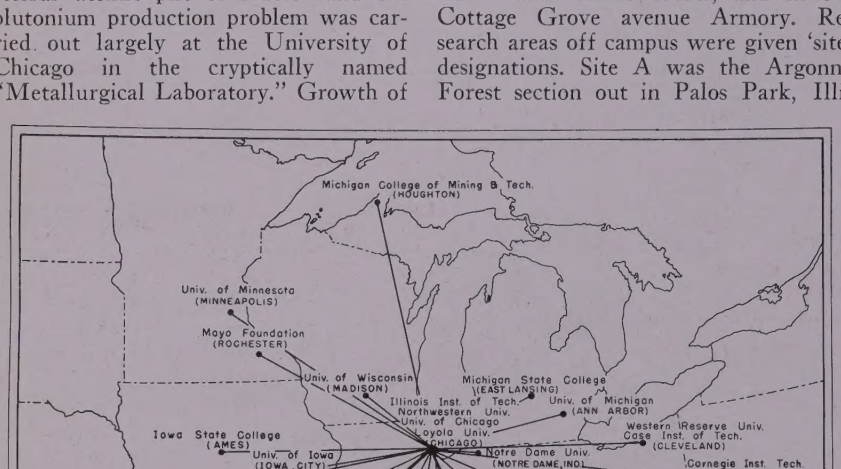
By Francis Green, E.E. '48

Until this moment, the Technograph has been unusually silent on the new and fascinating subject of the most prophetic invention in recent history—atomic energy. Initiated here is a series of articles designed to cover the more exciting and interesting aspects of the development, application, and cultural consequences of peacetime atomic energy research in the United States. First, read the conception and development of the Argonne National Laboratory, an organization hailing you from our very doorstep to show you dreams come true and advancements soon to gain fruition.

Under the terms of the Atomic Energy Act the U. S. Atomic Energy Commission is charged with keeping America on top in the field of atomic weapons. But its work in making available to the nation as a whole the benefits of atomic energy—thereby adding to the country's economic and industrial potential — is sometimes obscured by the technicality of these benefits and by the secrecy attending progress of a military nature.

Significant events leading up to the conception of the Argonne National Laboratory occurred in 1939 when Dr. Einstein wrote a letter to the President which resulted in the appointment of a liaison officer and a committee. No satisfactory results were achieved until Dr. Einstein wrote a second letter in the spring of 1940. In May, President Roosevelt created the Office of Scientific Research and Development under Dr. Vannevar Bush, which took over the atomic project. At this point was founded the research project which ultimately became the parent organization of the Argonne National Laboratories.

The research and development work done in connection with the first successful atomic pile or reactor and the plutonium production problem was carried out largely at the University of Chicago in the cryptically named "Metallurgical Laboratory." Growth of the research facilities sponsored by the University of Chicago, and responsible to the Manhattan District during the war, produced offices in Ryerson Physics laboratory, Eckhard Mathematics building, Rosenwald Museum, and part of the Chemistry laboratory on the campus, and offices in the new building set up for special purposes on the Ingleside avenue tennis courts, and in the Cottage Grove avenue Armory. Research areas off campus were given 'site' designations. Site A was the Argonne Forest section out in Palos Park, Illinois, and Site B was a brewery and ice house near 63rd street, Chicago, used for biological studies associated with the project.



Research institutions working with Argonne National Laboratories

The most important spot in the dramatic wartime development of atomic energy has not yet been mentioned — namely, the squash courts under the west stands of the University of Chicago stadium! It was here that on December 2, 1942 Dr. Fermi and a number of scientists gathered to witness the first daring demonstration of an atomic chain reaction, releasing atomic power in an amount limited only by the controlling hand of the operator. Most of these buildings and areas eventually became a part of the present Argonne National Laboratory physical plant.

The U. of C. Laboratories Get a New Name

On July 1, 1946, the name of the Metallurgical laboratory was changed to Argonne National Laboratory, after the Cook County forest preserve in which one branch of the laboratory has been located since 1943. The idea of a regional national laboratory operated by the University of Chicago for the Atomic Energy Commission was first proposed by an advisory committee on research and development appointed by Major General Leslie R. Groves, commanding general, Manhattan Engineer district, late in 1945. Dr. Arthur Compton, who was in charge of the development of the first successful chain reactor, was chairman of this committee.

The purpose of the national laboratory program is to provide for the research institutions of the country the costly facilities for atomic research, facilities too costly for any single institution to provide for itself. Tools of modern nuclear work — piles, accelerators, and the like — are far beyond the resources of most colleges. In the last year or two, it has become the fashion for any school which wants to build a strong physics department to dream up an appealing research program, sell it to the Army, Navy, or Manhattan district, and get government financing.

Negotiations are now in progress between A.E.C. and the military services to change that. A.E.C. wants future government-owned equipment centralized at the laboratories, where it will be widely available, rather than at individual institutions.

Because of the vital role played by

ne Metallurgical laboratory in the development of atomic energy, because a ighly qualified and experienced staff vas already at work in Chicago, and ecause Chicago is the logical center for ringing together the research talents of he entire midwest, the decision was nade to build one of the laboratories ere.

Two other laboratories have been rganized and are working along similar nes — Brookhaven laboratories at Camp Upton, Long Island, and Clinton aboratories, at Oak Ridge, Tennessee. Each laboratory has been assigned probems in special fields in atomic energy ngineering.

The Argonne National Laboratory at resent occupies several locations other han those at the University of Chicago nd at Palos Park. Included are a 39th treet, Chicago, warehouse and a new ix-square-mile area in the southeast orner of DuPage county, just north f the town of Lemont. This latter area ffers a number of advantages. Its nderlying strata of rock is good, its rainage is good, its accessibility is good, nd it does not contain extensive land mprovements. It is only five-minutes listance from the Palos Park pile facilies, making possible continued operation while the new facilities are under construction.

Layout of Laboratory

The new facilities just mentioned will be divided into two areas, one, the public area consisting of auditorium, guest, and medical buildings, and two, the larger restricted area which at present stage of planning consists of six major research buildings. On June 23, 1947, the University of Chicago announced retention of Ford, Bacon and Davis, Inc. of Chicago and New York, as architect-engineer-construction manager of the proposed new home of the Argonne National Laboratory.

Dr. Walter H. Zinn had been director of the Palos Park Argonne laboratory and with the inception of the new national laboratory, became director of that organization. In addition to the director, administrative organs are a Council of Participating Institutions, representatives of 29 universities and technical schools, and a board of governors. Other institutions which, because of research interests, qualified personnel and geographical location, find it possible and to their advantage to participate in the cooperative program of the Laboratory may be considered as possible future participants.

The board of governors is elected by the Council. The first board of governors consisted of:

Professor Farrington Daniels, chairman—University of Wisconsin

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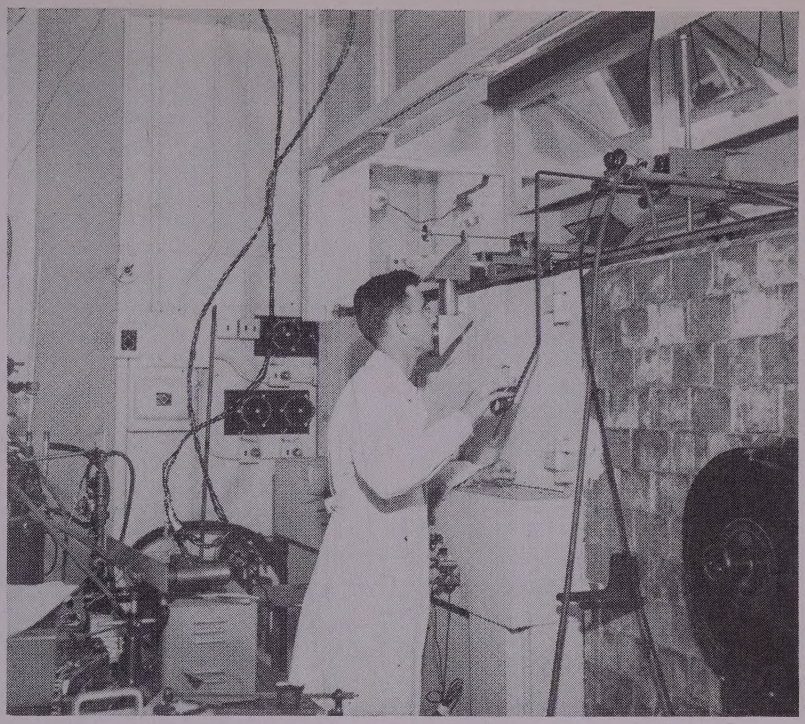
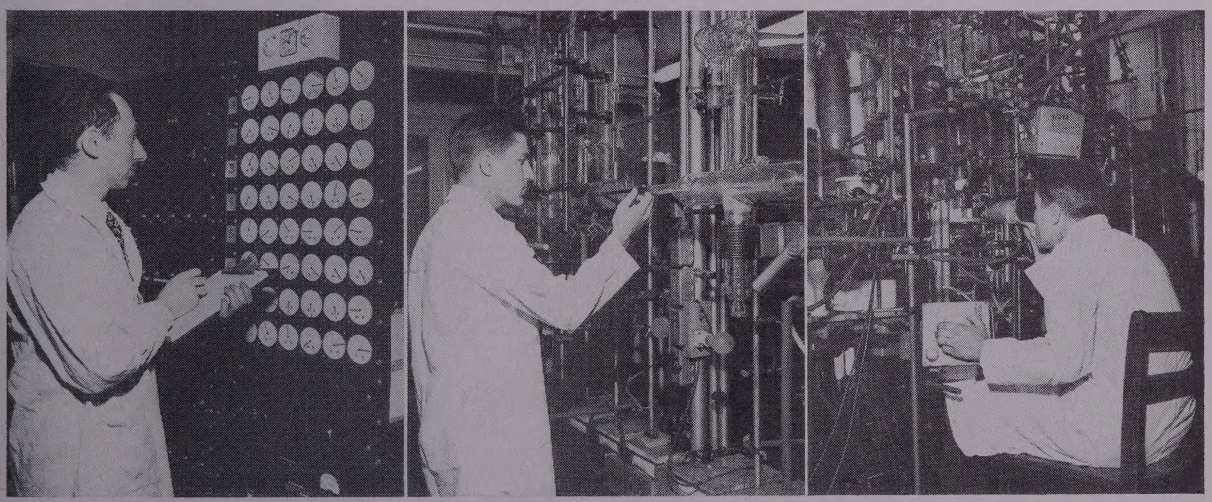


Working with radioactive materials without getting any nearer than the six-inch-thick lead-brick wall of the "Hot Room" allows



Left: The instrument panel of the pulse analyzer which determines the amount of radiation from different materials which may be in a mixture. Center: The elaborate vacuum system used to measure the vapor pressure of the radioactive materials. Right: Making precise temperature measurements of the crucible used to evaporate various new elements

Post-War Japan . . .

By Phil Doll, M.E. '49

Last summer during July and August the National Academy of Sciences, Washington, D. C., at the request of the war department, sponsored a six-man committee on a trip to Japan. The members of the committee included: chairman, Dr. Roger Adams, head of the department of chemistry, University of Illinois; Dr. William D. Coolidge, director of research (Emeritus), General Electric company; Dr. Royal W. Sorensen, professor of electrical engineering, California Institute of Technology; Dr. William V. Houston, president, Rice institute; Dr. Merrill K. Bennett, executive director, Food Research institute and dean of the social sciences at Stanford university; and Dr. William J. Robbins, director, New York Botanical Gardens. The purposes of the trip, as stated by Dr. Frank B. Jewett, president of the National Academy of Science, were as follows: "(1) To review with the American Military Government and the Japanese the plans which have been formulated for the peacetime organization and development of Japanese science and technology along democratic lines; (2) to give such aid to the American Military Government and the Japanese as the experience of the committee may suggest; and (3) by your presence as representatives of the Academy to show the Japanese that American scientists are interested in the re-establishment of their science along lines which will be permanently beneficial both to them and to the world at large."

During its forty-day mission to Japan to accomplish these purposes, the Advisory Group visited industries in the principal cities of Japan, discussed problems with the Military Government and the Japanese, and visited several prominent Japanese universities.

Japanese Universities

Many interesting sidelights on university life and teaching methods in Japan were observed. A complete university has seven "faculties," including law, literature, economics, science, engineering, agriculture, and medicine. Not all faculties are represented in all universities, but one university may have more than one faculty of the same kind. There are both government and private universities. The private universities on the average are older, account for about half of the university graduates, and have specialized more in the cultural sciences.

Dr. Adams says about the government, or Imperial, universities: "In external form the Imperial universities are similar to American and European institutions. The emphasis on the scholarly activity of the faculty and on graduate work, and the nature of the work required suggest a strong German influence." The unit of the Imperial universities appears to be the "chair," consisting of a professor, an assistant professor, and one or more assistants. All members of the staff of any Imperial university are government employees. However, the internal administration appears to be quite democratic. The deans are elected by the professors, and the president either by all the professors or by representatives of the various faculties. This democracy is probably more apparent than real, since the government Ministry of Education has the final word on everything.

Herein you can read of the first-hand experiences and observations of Dr. Roger Adams, head of the department of chemistry, set down during his recent travels through Japan. He and his committee made a survey and study of education conditions and practice and research facilities in order to advise the reconstruction program for that country. See for yourself some of the amazing forces and effects which shape the oriental mind and his actions.

The Ministry of Education also establishes regulations concerning private universities; hence they may be called private largely because they are self-financed. Dr. Adams says of the private universities: "They seem to represent a more liberal and democratic spirit than do the Imperial universities."

Following the German tradition, there is a high degree of specialization in a Japanese university. A student is confined to a single faculty, and all general education is obtained before entering. A graduate student is attached to one professor and works under his guidance. Being in such close contact, there is a strong transfer of loyalty to the professor. This probably exerts an undue influence on the thinking and activities of many scientific men, leading to concentration of activity in very narrow fields and a lack of breadth in training and interest. It also leads to competition among scientists and scientific institutions rather than cooperation, and probably hinders the general development and spread of scientific attitudes.

On the whole, all salaries are low, and members of the teaching staff must supplement their incomes in any way possible, such as teaching in other institutions and doing consultant work.

Scientific Research

Scientific research in Japan today is carried out in three ways; by university professors, by government and independent research institutions, and by research laboratories closely associated with industrial organizations.

Every university professor is expected to carry on research in his field; however, as Dr. Adams points out, "Much university research is somewhat esoteric in character. Mathematicians prefer such things as number theory to analysis or to work in applied mathematics." The idea of proving to the rest of the world that Japan has a superior culture is the dominating idea in too many university minds, and sometimes blots out research of a practical nature. The research equipment seems fairly good, but much of it is not in use at present. Also, the equipment is rather poorly maintained which is probably partly due to the mental preoccupation of the reseach assistants with supplementing their low wages.

There is also a number of research institutions which are either supported by the government or supported independently. The Ministry of Agriculture supervises a laboratory which, on the whole, does worth-while work and makes the results available to farmers. The Ministry of Communications has a laboratory for electrical standards. A number of other laboratories working on specific problems related to industry are maintained by the Ministry of Commerce and Industry. The problems include work in such industries as ceramics, mining, and textiles.

The self-supporting laboratories are few in number and quite large. They are skillfully managed, however, and even develop their own products and manufacture them. Few research laboratories run by industrial organizations attempt any pilot-plant operations in developing new processes as is done in this country. The staffs in these laboratories often devote much of their time and energy to testing and control.

The government and independent laboratories work in close contact with the university laboratories. Indeed, they are staffed by a large percentage of university graduates, and employ professors as part-time research men. On the other hand, the industrial laboratories have

(Continued on Page 34)

Protect Yourself

by Carl Sonnenschein, M.E. '48

What engineering student has not at ne time dreamed of producing a rld shaking invention? The answer obviously, that there are quite a few. ow many inventors have lost the eco- mic privileges which should have ac- ued to them from their inventions? ere, unfortunately, the answer is that ere have been many.

The purpose of this article is not to tline a plan for a potential inventor follow for production of an invention ich will earn for him a million dollars. ather, our purpose shall be to outline e type of procedure which should be llowed so that the inventor may be re to reserve to himself the benefits d earnings from his invention.

Most people are acquainted with the ct that there exists at Washington, . C., an organization known as the nited States patent office. The patent ffice is a part of the United States partment of commerce and is housed a building known as the United tates Patent Office building.

History of Patent Office

The present United States patent sys- m came into existence as the result of act of Congress which was passed 1834. The first patents were granted 1836, and since then there have been 400,000 patents granted by the patent ffice.

To go back just a little farther in r national history, we can call to mind rticle I, section 8 of the Constitution hich says:

"The Congress shall have power . . . to promote the Progress of Sci- ence and useful Arts by securing for limited Times to Authors and In- ventors the exclusive Right to their respective Writings and Discoveries."

It was on the strength of this Con- itutional authorization that the act of 834 was legal. Clearly, the men who rote the Constitution realized the im- ortance of inventors and their work in ne national economy.

Now, you may ask, what does the ct of 1834 guarantee to the inventor nd in what ways does it protect him? he act provided for the granting of atents for a period of seventeen years, ith the provision that renewal could nly be accomplished by an act of Con- ress.

The inventor is guaranteed the full ontrol over his invention; he can pre- ent anyone from making, using, or lling his invention. On the other hand, he inventor can lease manufacturing ights or may do his own manufacturing f the item on which he holds a patent.

The government reserves the right to efuse patents if the item in question an be considered deleterious to the pub- ic welfare, or if it appears to infringe pon the prior patent rights of another nventor. By the same standards, it must be a useful item and must be a novelty.

Supposing that you have, or think you have invented an item that is worth being patented. There are several very essential and important steps which must be taken in order that you may obtain your legal rights regarding your brainchild.

Were a business man to attempt to run his business without keeping proper records he would be regarded very poorly by the people associated with him. Such is also the case with inventors. The inventor should be just as systematic about his business as is the successful businessman.

All engineers, as potential inventors, will be interested in this straightforward article which contains valuable data about patents. Certain procedures and records are mandatory in realizing the worth of your idea or invention.

Complete records of all correspondence, notes, and experimental data should be kept and carefully dated. Wherever possible, important dates should be attested to by the signature or knowledge of a responsible party. This will become more apparent as we proceed.

Back-tracking a bit, we recall that there must have been a time when a realization of a need for the item was first conceived. Possibly not at this date but at a subsequent one, an idea was forthcoming as to the means of fulfilling this need. Perhaps preliminary sketches were made and miscellaneous notes scribbled on scratch paper; all of these papers should have been kept and carefully dated for further reference.

As soon as the fundamental ideas had crystallized, a set of working drawings should have been made up, with accompanying descriptive material. These drawings need not have been to an accurate scale, but they should have possessed all of the necessary dimensions. The drawings should have been clearly explained with numbers referring to the specific parts of the mechanism. At such a time, it would have been a good idea to write down what the invention was supposed to accomplish and what bad features of other machines or mechanisms it would overcome.

Briefly, and in summary, these preliminary drawings should have told what the invention was related to, what its object was, what the various drawings were intended to show, how the mechanism would be constructed, and lastly and most important how it was expected to work.

For our purposes, we will assume that you have successfully fulfilled all of these preliminary requirements and that now you want to proceed with the formal part of obtaining your patent.

The first step would be to take the preliminary drawings and statements, which you have made, to a notary public and have him attest them and attach his seal to them. Of course, there are other ways of establishing the date of inception; such as having the papers signed, each one individually, by at least two qualified witnesses, or by mailing the papers to oneself through the government mails. If the latter mentioned system is used, the seal on the envelope should not be broken unless the papers are needed at some later date as evidence in court due to litigation arising from your patent claims. This action will definitely establish your claims as to chronological inception of the ideas pertinent to your invention.

Obtaining a Patent

In addition to the notarizing of the papers themselves, the following information should be attached to the technical papers and should also be notarized.

(a) The original date when you first thought of this invention.

(b) The date when you first told anybody else about your ideas or invention.

(c) The date when you first started to work out the practical considerations subsequent to being able to construct a working model.

Having proceeded this far, it is now wise to obtain the services of a good patent attorney. Only certain men are allowed by the patent office to practice patent law. Strange as it may seem, a patent attorney need not be an attorney-at-law. Many of the successful patent attorneys are engineers who have been able to satisfy the patent office as to their qualifications and have thus been permitted to practice patent law.

After you have contacted your attorney, you must then be ready to put full trust and confidence in him. The reason

(Continued on Page 30)

In This Corner... NAVY PIER

SHOP TALK

By John Fijolek, E.E. '51

In addition to the machine shop courses described in a previous issue, two other shops have been in operation at the Chicago branch since September, 1947. These shops have been a welcome addition to the engineering students of sophomore standing for whom the courses are limited.

Aeronautical engineering students in M.E. 81 (foundry and welding laboratory—two hour course) are divided into two groups at the beginning of the semester. One group begins the study of molding principles while the other is trained in light welding principles. The two groups change their study of each subject around the middle of the semester.

In the welding laboratory seven asbestos-lined booths each contain a welding bench and an a.c. welding machine. These booths occupy one side of a large room which also contains a spot welder and seven gas welding stations. Light welding with ferrous and aluminum materials is emphasized. Practice makes the study more interesting as can be evidenced from the photographs showing some of the equipment being operated by the students.

The foundry group is given practice as well as theory in melting of metals, testing of castings, and testing of sand so that a good knowledge of the processes involved is obtained.

More time is spent on foundry principles in M.E. 85 (pattern and foundry laboratory—two hour course). Pattern design is taught, and, as in all of the courses described above, the emphasis is placed not so much on manual work skill as on the knowledge of the processes involved and the testing of the product and materials used.

Movies and slides supplement the laboratory work which is carried on in a shop well-equipped with benches, conveyor, molding machines, a core room, a sand testing laboratory, and melting equipment including an electric arc furnace.

Professor Kozacka's staff in the foundry consists of one supervising instructor, two instructors and one mechanic. The welding shop, which has the smallest number of students at one time, has one instructor to supervise all operations.

Engineering Societies

By Clarence Niebow, Ch.E. '51

Although the Navy Pier branch is only a little over a year old, its engineering societies are well organized. They are sponsored by competent men with good engineering background. All the societies here at Navy Pier function through the College of Engineering except the Chemical Engineering society which is activated through the College of Liberal Arts and Sciences. The following items will give you a summary of the progress and future plans of the societies.

A.S.M.E.

The Mechanical Engineering society is sponsored by Mr. C. T. McDonald of the general engineering drawing department. The society has affiliated itself with the student chapter of t A.S.M.E. So far the group has h quite a few speakers, the first one bei Dr. Norman Parker, head of the m chanical engineering department at U bana. He spoke on the subject, "Cu ricula of the Junior and Senior Ye in Mechanical Engineering." They ha had one field trip to the Carnegie Mi of the United States Steel corporatio An all-day field trip is now beir planned to the tractor works of the I ternational Harvester company, whe the group will be especially intereste in the forge shop, the die-casting sho and the machine shop. The officers a Joe L. McCaffery, president; Geral Lerman, vice president; Edward Ha per, treasurer; and Lambert Kilboy, se retary.

A.I.E.E.

The sponsor of the Electrical Eng neering society is Mr. W. K. LeBol They have affiliated themselves with t student chapter of the A.I.E.E. and ha had Dr. J. E. Hobson, director of t Armour Research foundation, talk t them on, "The A.I.E.E. and the Pr fessional Registration of Electrical E gineers." Also Dr. W. L. Everitt, hea of the electrical engineering departmen at the University of Illinois spoke o "Electrical Engineering and Options. Mr. LeBold hopes to get speakers o communications, radio, and illuminatio The group has not elected its office as yet; but the acting secretary is R Petersen who is also chairman of th nominating committee.

A.S.C.E.

The civil engineers are headed by M J. C. Chaderton of the mechanic engineering department. This group ha

Left: Students applying their knowledge of welding principles
Right: Pouring a casting in the foundry laboratory

iliated itself with the student chap- of the A.S.C.E. Mr. George Salter, lwest representative of the A.S.C.E., ressed the group on, "The Functions the A.S.C.E." The society hopes to e a speaker every month. The offi- s of the club are: William Lingo, sident; Gary Cass, secretary; and nes Swendsen, treasurer.

Ch.E.

This group is sponsored by Dr. Meloy o is also head of the chemistry de- rtment here at the Pier. This group s not affiliated itself yet, but is now gotiating with the chapter downstate membership into the A.I.Ch.E. Mr. assel of the American Can company ently addressed the group on the, hermal Processing of Food." The xt speaker is going to be Mr. A. I. egan, a lawyer, who will speak on me interesting facts about patents. Re- ntly the chemical engineers went on field trip to the Standard Oil com- ny where they inspected the research boratories. The recently elected offi- rs of the group are: Claude Lucchesi, esident; George Duwel, vice presi- nt; Neal Smith, secretary; and Her- an Petsch, treasurer.

FACULTY IN REVIEW

By Norbert W. Ellmann, M.E. '51

RUPERT M. PRICE

In passing through the lounge adja- nt to the lunchroom, one may happen glance in a southerly direction and otice a white sign just above an office oor. The sign reads "Associate Dean of ngineering Sciences." This is the office which Rupert M. Price, M.A., as- stant to the associate dean of engineer- ng, conducts some of the many duties alling to him in the post. Mr. Price also an assistant professor of physics, nd a staff counselor in the student ersonnel bureau.

Born in 1906 at Waynesville, Illinois, Mr. Price completed grade school and high school in Waynesville and went on to Eureka college at Eureka, Illinois. Later he received his master's degree at the University of Illinois.

For twelve years Mr. Price coached basketball, baseball, and track for the Atlanta, Illinois, high school. He then became the high school principal at New Holland, Illinois, a position which he held for five years. For two more years he held the position of principal at the Washburn, Illinois, high school, during which time he spent the summers teaching mathematics at the University of Illinois.

Mr. Price's hobbies are hunting and fishing. That he is a true sportsman is evidenced by the fact that he uses archery equipment instead of a gun to do his hunting. This is far from being a handicap, however, because Mr. Price usually returns from his hunting trips with a fine catch of rabbits and pheasants.

Mr. Price married a school teacher and has three children, two girls 7 and 13, and a boy 9 years old.

RUPERT M. PRICE

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•

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Rhet Instructor: "John, take this sentence: 'I led a cow from the pasture.' What mood?"

P.E.: "The cow, sir."

* * *

Last year's graduating electrical engineers have learned how to apply their knowledge in a practical way. They are now using the "right hand rule" to obtain transportation.

* * *

POME

Mary bought a "New-Look" dress,
The style was very dare-y.
The dress, it doesn't show the dirt,
But WOW! It sure shows Mary . . .

* * *

Dorothy Plummer . . . Here's your name in print. NOW will you buy a subscription?

PIER CLOSE-UPS

By Richard Choronzy, M.E. '51

TAYLOR BROWN

Twenty-five miles is a long way for a person to go to and from school each day. That is the distance Taylor Brown travels from his suburban home to Navy Pier, and furthermore, he likes it. "Education is worth its time in travel and study. If I had to travel 100 miles, I'd stil do it." These words were stated by the quiet, unassuming freshman at his drawing desk in room 135.

Taylor, a civil engineering student, hopes to continue with his education until he receives his Ph.D. Apparently, he is trying to folow in his dad's footsteps because the elder Brown is chief engineer of the highway and bridge construction division of the state in the Chicago area.

Taylor Duane Brown was born in Kankakee, Illinois, on May 28, 1929. When he was 6 years old, his family moved to Downers Grove, Illinois, where he lives at present. During his high school years he played the clarinet in the school band and was graduated from Downers Grove high school last June. The few months between high school and college life he spent with his father studying the various kinds of jobs performed by a civil engineer. His choice of civil engineering as a career resulted largely from his liking for the work his father does.

His chief hobby is hunting and his favorite sport is boxing, at which he is quite adept. Taylor has a girl friend, Helen Smith, with whom he has made future engagement plans. He plans to specialize in bridge construction work after graduation.

TAYLOR BROWN

ILLINI IN ACTION . . .

By Herbert Jacobson, M.E. '50

Two more graduates of the engineering department of the University of Illinois were awarded honors, when WALLACE A. DEPP and EDGAR A. POST, both of the class of '36, were presented the Eta Kappa Nu award by the American Institute of Electrical Engineers at its winter meeting January 26. This award is presented annually to the engineer selected as the most outstanding young electrical engineer on the basis of his technical achievements and on his civic, social, and cultural activities. These two men were both given honorary mention citations for the year 1945.

Starting to work with United Air Lines in 1936 as a radio engineer for the design and supervision of construction of aircraft radio equipment, Mr. Post was soon promoted to the position of assistant supervisor and acting radio engineer, a position he still holds today along with that of superintendent of navigation aids. During the war he attained the rank of lieutenant colonel and was chief of systems at the Aircraft Radio laboratory at Wright field where he had direction of the installation and flight testing of all prototype radio, radar, and counter measure equipment in army air force aircraft. A member of A.I.E.E., I.R.E., and Tau Beta Pi, Edgar Post is a member of the VHF Radio Ranges and Radio Instrumentation committee of the Radio Technical Commission for Aerounautics. At present, he is a recognized authority on automatic flight control, airways traffic control, and aircraft instrumentation.

The other alumnus presented the Eta Kappa Nu award, Wallace A. Depp, B. S. '36, M.S. '37, is a graduate with high honors. He is a member of A.I.E.E., Tau Beta Pi, Sigma Xi, and the American Federation of Scientists. After graduation, he was employed by the Bell Telephone laboratories in New York where he designed cold-cathode tubes, thyratrons and spark gap tubes for radar, and thyratrons for the proximity fuze. At the present time he is in charge of basic development of gas-filled tubes for Bell Telephone laboratories. Wallace Depp has been granted several patents and has a few pending now. The author of several publications, he is very active today in radar and cold-cathode tube research.

The Eta Kappa Nu award, suspended during the war, was resumed by the A.I.E.E. at its winter meeing in Pittsburgh. An award was presented for each of the years from 1942 to 1947. Out of ninety-five candidates, two of the winners were University of Illinois alumni. The award is only given to engineers less than thirty-five years of age who have been graduates for not more than ten years.

ERNEST E. CHARLTON, X-ray section head of the General Electric research laboratory, has been appointed chairman of the American Institute of Electrical Engineers' therapeutics committee for 1947-48. Born on December 17, 1890, at Meriden, Iowa, Mr. Charlton received his bachelor of arts degree in 1913 from Grinnell college. He obtained his master of science and doctor of philosophy degrees in 1915 and 1916, respectively, from the Univecsity of Illinois, and was awarded a doctor of science degree in 1945 by Grinnell college. He has been employed by General Electric company since 1920 during which time he has engaged in research activity. Mr. Charlton served on the therapeutics committee during 1946-47.

HUBERT MICHAEL TURNER, associate professor of electrical engineering, Yale university, has been appointed 1947-48 chairman of the American Institute of Electrical Engineers' committee on award of institute prizes and of the technical program committee. Born in Hillsboro, Illinois, July 20, 1882, Mr. Turner received the degrees of bachelor of science (1910) and master of science (1915) from the University of Illinois, and was instructor here from 1910 to 1912. He joined the faculty of the University of Michigan as instructor in electrical engineering in 1912 and in 1918 became assistant professor of Yale university. He was appointed associate professor in 1926. Mr. Turner has been chairman of the institute committee on communication and has served on the committee on instruments and measurements. He holds a number of patents and is the author of numerous technical papers. He also is a member of the Institute of Radio Engineers, International Scientific Union, the American Association for the Advancement of Science, Franklin Institute, American Society for Engineering Education, Eta Kappa Nu, and Sigma Xi.

In 1944, CHARLES E. RAMSER '09, received the John Deere medal of the American Society of Agricultural Engineers for special investigation and drainage research conducted for the Soil Conservation Service of the U. S. Department of Agriculture. Recently, the U.S.D.A. engineer was honored again when his bulletin, "Prevention of Erosion of Farm Lands by Terracing," first issued in 1917, was listed as one of the outstanding scientific publications by U.S.D.A. research workers.

E. T. BLIX '20, who was chief engineer on the project to build the Sky Ride for the 1933 World's Fair, now is manager of the Melrose Park plant of the Mississippi Valley Structural Steel company, a firm he has been with since graduation. He started as a detailer in the Decatur plant, worked into sales and was in the Kansas City and Chicago offices. In 1929, he was made chief engineer of the Melrose Park plant, a position he held until his promotion.

ROBERT C. LEWIS '36 has joined the staff of the Aero-Elastic Research laboratory, Massachusetts Institute of Technology. Formerly chief engineer of the vibration division of M.B. Manufacturing company, he will continue to serve M.B. as a technical consultant and will practice as a consulting engineer. He previously was associated with the Crane company research laboratories and later was head of the vibration department of Vega Airplane company.

PHILIP STEELE, M.E. '89, Chicago, secretary of his class and one of the most noted of the older Illini (older in point of years only), recently was the guest of honor at a dinner celebrating his 50 years of service with the Municipal Employes Insurance association of which he is president.

Guests included many old friends and members of various unions, representing some 20,000 employes. Former mayor of Chicago, Edward J. Kelly sent a personal letter commending and thanking Mr. Steele for his "long years of faithful and capable public service and for the contributions made to the welfare of . . . fellow employes . . ."

The monthly bulletin of the Municipal Employes society carries a summary of his career of duty: 1. Entered the Civil Service of Chicago in 1895; was later promoted to chief engineer of the Springfield Avenue Pumping station and now is rounding out fifty years in the service. 2. Was one of the founders of the Chicago Civil Service league which was organized in 1901 to protect and promote the interests of civil service employes of the City of Chicago. 3. Was instrumental, along with Bernard McMahon, John P. Dillon, and others in the founding of the Municipal Employes Pension fund. 4. One of the organizers and first president of the Municipal Employes society, which has protected and promoted the interests of contributors to the Pension fund since 1912. 5. One of the organizers of Local 556-556A, International Union of Operating

(Continued on Page 40)

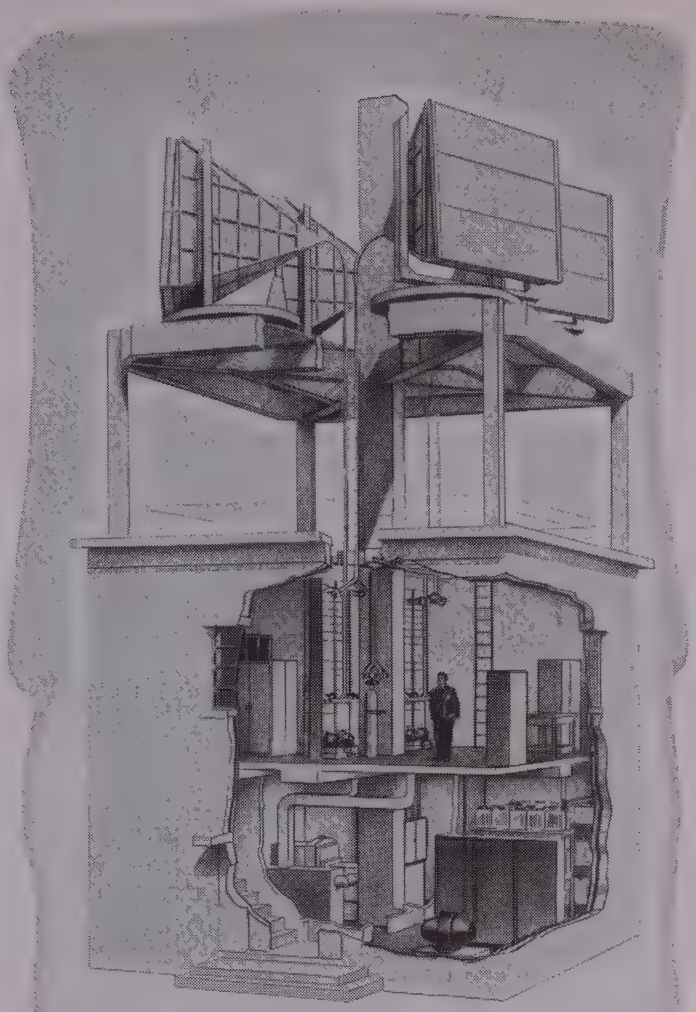
TELEPHONY'S SEVEN LEAGUE BOOTS...

THIS tower reflects great strides in communications. It's one of the seven new radio relay towers that link New York City and Boston.

This new path for Long Distance communication uses microwaves . . . free from static and most man-made interference. But, because microwaves shoot off into space instead of hugging the earth's curve, we've had to build relay stations within line of sight to guide the waves between the two cities. Atop each tower, metal lenses gather these waves and, after amplification, relay them to the next tower. The lenses focus and direct the radio waves like a searchlight beam.

This new system for transmitting Long Distance telephone calls, radio and television programs is but one phase in the Bell System's program for improving this country's communication service; a never ending program of growth and development in which many telephone engineers will participate, and whose careers will develop with it. *There's a future in telephony.*

BELL TELEPHONE SYSTEM



A cut-away view of a typical radio relay station. Emergency power equipment and storage batteries are on the first floor, radio equipment on the second floor, and the special microwave antennas which receive and beam the communication signals are on the roof.

Introducing by Tom Moore, C.E. '50

Shirley Smith, E.P. '50 and Connie Minnich, C.E. '51

JAMISON VAWTER

In 1937 the College of Engineering added another full professor to its staff — Jamison Vawter, professor of civil engineering.

Mr. Vawter, the son of a doctor, was born April 21, 1889, in Arkansas City, Kansas. His family moved at various times to Kentucky, Oklahoma, and Missouri, but they returned to Arkansas City, where Mr. Vawter spent the last three years of his high school career and graduated in 1908. In 1916 he received his B. S. and C.E. degrees from the University of Kansas. Mr. Vawter commented with a smile, "It didn't take me those eight intervening years just to go through college." He later received his M.S. from Illinois.

In World War I, Mr. Vawter spent two and a half years with the army in France, and then served in the army of occupation in Germany in 1918 and 1919. Before joining the University staff, he worked six years for the Santa Fe railroad and instructed at the University of Kansas another two years.

Then, in the fall of 1922, Mr. Vawter accepted the position of assistant professor at Illinois. In 1931, he became an associate professor.

Now, at Illinois, Mr. Vawter instructs graduates and advanced undergraduates in civil engineering, but his principal problem is taking care of irregular engineering students and keeping C.E.s properly registered. He remarked that since the beginning of the war he has had little time for vacationing or his favorite sport, fishing.

Mr. Vawter is one of the joint authors of the book, "Theory of Simple Structures," and he is, of course, a member of the American Society of Civil Engineers. Along with the A.S.C.E., he holds membership in several other honoraries and societies: Theta Tau, Sigma Psi, Tau Beta Pi, Chi Epsilon, Tau Nu Tau, American Railroad Engineesre association, American Society for Engineering Education, and Scabbard and Blade.

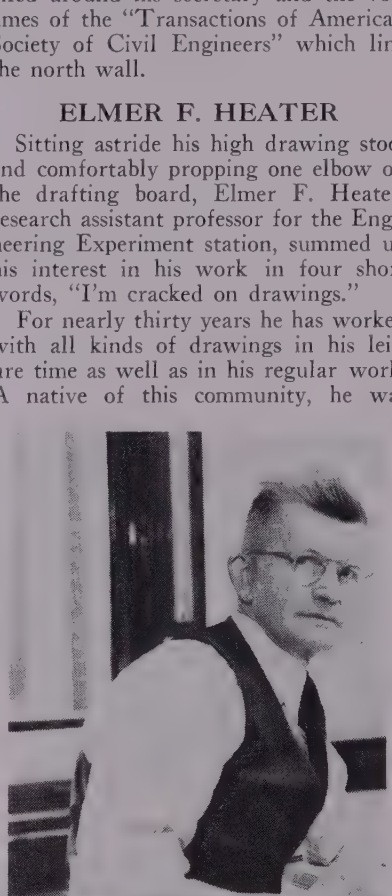
When asked if he had any particular inspiration or guidance toward a civil engineering career, he thought a bit and then, smiling, said, "No, I did what the YMCA says not to do. I just drifted in."

If you engineers who have no direct contact with Professor Vawter will pass room 307 Engineering hall a little slower than usual, you will probably see him at the opposite end of the room turning between a table and roll-top desk by means of a swivel chair. If he isn't in, you'll recognize his office by the work piled around his secretary and the volumes of the "Transactions of American Society of Civil Engineers" which line the north wall.

ELMER F. HEATER

Sitting astride his high drawing stool and comfortably propping one elbow on the drafting board, Elmer F. Heater, research assistant professor for the Engineering Experiment station, summed up his interest in his work in four short words, "I'm cracked on drawings."

For nearly thirty years he has worked with all kinds of drawings in his leisure time as well as in his regular work. A native of this community, he was



ELMER F. HEATER

born near Thomasboro, Illinois, and attended Champaign high school. During his college career as an electrical engineering student, he became a member of Eta Kappa Nu. After graduating from the University with a B.S. degree in 1911, he was employed by the General Electric company in Harrison, New Jersey. This job was succeeded by a position with the Public Service Company of Northern Illinois from 1912 to 1915. The next two years found him with the Westinghouse company, and then he returned to Urbana to become a draftsman with the University Engineering Experiment station. This finally resulted in his present position as research assistant professor.

Producing a number of gray-bound publications which read, "The University of Illinois Engineering Experiment Station Bulletin," he thumbed through one of them, displaying a few of the many diagrams, illustrations, and charts. He explained that the report on any one of the many station research projects is first submitted to the station staff. If accepted for publication as a bulletin it is given to the editorial offices to be prepared for the printer. The editor and Mr. Heater first make a preliminary estimate of illustration sizes and arrangements. Mr. Heater then checks the drawings with the manuscript for notes, captions, and references. Finally he prepares the drawings so that cuts at the size desired, may be made by the engraver. Photographs for half-tone are marked for size, screen, and finish. After a final check by the author, the "copy" is ready for the engraver and Mr. Heater's work on another bulletin is finished. These station bulletins are usually published at the rate of one a month and deal with everything from domestic heating to many industrial problems. One of the publication's main tasks, he stated, "Is to keep scientific research down to human appeal."

Reminiscing over his past work, he recalled one incident in which the director of the station came into his office to discuss the reproduction of a portion of a geological map. The director was sure that the only safe method was by a half-tone and refused to believe that it could be done by a line-etching, as Mr. Heater had suggested. To prove his point, Mr. Heater had both the half-tone and the line-etching made. After he had examined the results, the director admitted the line-etching was the better of the two.

In his hobby of stamp collecting, Mr. Heater has gone beyond the "ordinary squirrel stage of collecting" and has written papers on his latest specialization, the classification of some of the United States envelopes. Another one of his favorite pastimes, fishing trips in Wisconsin, was interreupted by the war.

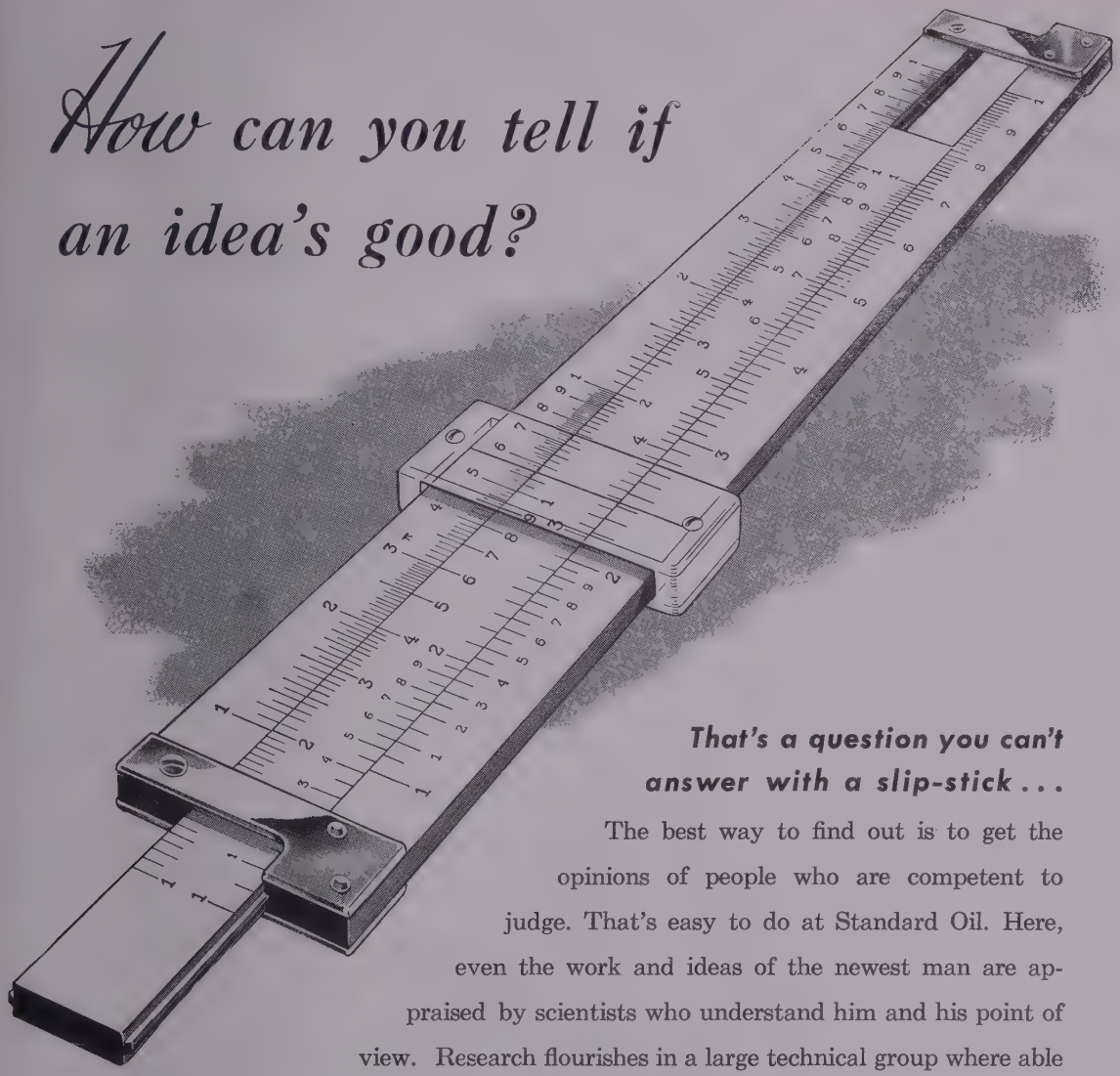
Readers of the station bulletins can appreciate the work and detailed checking done by Mr. Heater, who is to be commended for his fine record.

JOSEPH M. COOK

In June, 1946, Joe Cook set a record at the University by completing his undergraduate requirements in five and one-half semesters. As an undergraduate Joe was enrolled in engineering physics but to get into graduate school early he transferred to the Division of Special Services for War Veterans.

(Continued on Page 26)

How can you tell if an idea's good?



That's a question you can't answer with a slip-stick . . .

The best way to find out is to get the opinions of people who are competent to judge. That's easy to do at Standard Oil. Here, even the work and ideas of the newest man are appraised by scientists who understand him and his point of view. Research flourishes in a large technical group where able chemists and engineers, in the light of their broad experience, evaluate the ideas of the younger men. Under such favorable conditions, capable technologists combine their efforts and convert good ideas into practical achievements. The vast, progressive petroleum industry is jam packed with possibilities for men with ideas.

Standard Oil Company

(INDIANA)

STANDARD

STANDARD SERVICE

The Engineering Honoraries and Societies

By John Shurtleff, Ch.E. '50 and Dick Hammack, G.E. '48

ETA KAPPA NU

Alpha chapter of Eta Kappa Nu association, the honorary society for electrical engineers, began its fall activities with the presentation of its annual award to Richard A. Campbell of Mt. Sterling, Illinois, for achieving the highest scholastic average in electrical engineering at the end of the sophomore year. Murray L. Babcock, Alpha chapter president, made the presentation at an I.R.E.-A.I.E.E. meeting held October 23, 1947.

January 7, 1948, was the date of initiation for twenty-four seniors and fifteen juniors. Seniors were Lawrence E. Brennan, George L. Clark, Burton L. Cordry, John M. Del Vento, Joseph J. Du Rapau, Richard J. Fahnestock, John E. Farley, Francis P. Green, Howard L. Johnson, Robert G. Knowles, Robert L. Jones, Thomas E. Kurtzer, Robert G. Lakin, Robert E. Lepic, Edward Lovick, John R. Massey, Maurice R. McCrary, A. G. Peifer, William E. Powers, Charles M. Riecker, Joseph A. Saloom, Robert C. Schneider, Lenix H. Swango, and Norman H. Tarnoff.

Juniors who were initiated are Delmond C. Bangert, Kenneth R. Brunn, Robert H. Brunner, Glenn M. Burgwald, Edmond E. Connor, Frank J. Dill, Floyd Dunn, Milton L. Embree, Edward W. Ernst, Frank J. Ocnaschek, Willard A. Schaaf, Donald K. Schaeve, James H. Schussele, Harold B. Scott, and Lynn E. Wolaver.

A.I.E.E.-I.R.E.

Mr. Slinger of General Electric was the speaker for the meeting of Dec. 12. Speaking on the subject of power transmission, he discussed the electrical, mechanical, financial, legal, and economical aspects of power distribution lines. He stated that for every dollar spent for power generation, fifty cents is spent for transmission. It is estimated that the amount of power generation will increase 300 percent in the next fifteen years.

At this meeting, the St. Patrick's Ball, to be held in March, was voted upon and approved.

The A.I.E.E.-I.R.E. is at the present time distributing questionnaires to all engineers in the electrical engineering department to obtain the students' reactions to present teaching practices and policies. It is hoped that many constructive criticisms, comments, and approvals will be made. The program has the full cooperation of the electrical engineering department, and is conducted under the policy to make the University of Illinois the best school in the country.

The annual electrical engineering senior-faculty banquet was held at the Urbana-Lincoln hotel on Jan. 15, 1948. This is the students' chance to poke fun at the instructors, and a very good time was enjoyed by all.

The Buck Knight trophy contest between the A.S.M.E. and this society was held on Jan. 13. Four contestants from each group met and had a quiz program on non-engineering problems.

R.C.A. furnished the program for the meeting of Jan. 22. The topic was, "How to Get a Job in Industry." Many helpful hints were given on how to get the most out of job opportunities, and the desirable features of a company were discussed.

I.T.E.

The student chapter of the Institute of Traffic Engineers has been hard at work lately. The results of the recent campus traffic studies have been compiled and are in the process of being analyzed in an attempt to reach solutions to some of the traffic problems.

A resolution was sent to the Champaign city council recommending that it enforce the present traffic ordinances, paying particular attention to the sections on the traffic commission and its assigned duties. It was suggested that other articles be revised to meet present-day conditions. It was also recommended that the commission establish a program of traffic improvements, to provide for correction of traffic hazards, as well as to review the street construction program for traffic design and coordination with city planning. It was also recommended that a definite traffic financing plan, utilizing parking meters and other forms of revenue, be formulated. A suggested list of major items to be considered in this plan was included.

A letter was received by the chapter from the Champaign city engineer on behalf of the traffic commission, thanking it for its recommendation and saying that any further suggestions would b kindly received.

A resolution to University official is now being drawn up by the chapte to give its recommendation on the nee for more adequate parking facilities i the campus area. This problem has bee under study by the chapter with severa parking studies having been made. Thes studies showed that a great portion o the available parking spaces are bein occupied by all-day parkers. This re duces the facilities available to th "short-time" parker, for whom stree parking is theoretically planned.

The last meeting of the semester wa held January 21. Everyone is welcom at any of the regular meetings held ever second Wednesday in the evening. Th meetings are normally round-table dis cussions by the members on local traffi problems and their solutions. Any nev ideas are always welcomed, so watch fo the red flag outside Professor Wiley' office announcing a meeting.

TAU BETA PI

On Wednesday, December 18, Ta Beta Pi, all-engineering honorary, enter tained at an informal meeting, fifty seven men selected from all phases o engineering on the basis of distinguishe scholarship and exemplar character. These men wer introduced to the history an purposes of Tau Beta Pi b Professor W. N. Espy of th department of mechanica engineering.

Those invited to pledge ship are Bryce E. Alberty Henry O. Barton, Ralph W Behler, Albert W. Berg, Lawrence E Brennan, Robert H. Brunner, Edmon Brown, Donald Q. Brown, Maurice L Burgener, Roger W. Caputo, Richar A. Coderre, Edmond E. Connor, Burto L. Cordry, George T. Dellert, Charle E. Drury, Floyd Dunn, Arthur N Fleming, Jerome L. Fox, Gerald Ger aldson, Edward W. Ernst, Walter D Hays, James L. Honnold, William G James, Harry G. Kabbes, Alfred W Kellington, Otho Kile, Robert G Knowles, Stafford W. Kulcinski, Rich ard G. Love, Joe L. Mazer, Kennet F. McGann, and Don C. Miller.

Also invited were Joseph B. Morri son, Frank Ocnaschek, John J. Perry Joseph Pechloff, Orville R. Pomeroy

(Continued on Page 28)

This girl can beat 50 monks to a standstill

Nowhere in the world are elevators as luxurious—efficient—and safe—as in America. Nowhere are such ingenious improvements made so consistently . . . so rapidly.

The ancestor of elevators—a crude basket attached to the end of frayed rope—*still* is in daily use—the only access to some monasteries in Greece. Powered by monks, fifty of whom could not do what a little slip of a girl does with one hand, these "elevators" try the nerves of brave men.

American ingenuity, born of individual enterprise, and nurtured by free competition, not only gave us the world's best elevators, it gave us a great industry employing thousands of men and using the products of a score of other industries.

The wire rope industry is not among the least of these.

Roebling engineers have kept pace with the designers of "lifts" ever since the first American elevator was installed with a Roebling elevator rope —back in the early 1860's.

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GEORGE R. FOSTER
Editor

•

EDWIN A. WITORT
Assoc. Editor

the Illinois Technograph

OFF and ON...

This editorial is designed to jar you out of an attitude of complacent ignorance. It isn't going to be pretty; so if you are easily offended, quit reading it now.

Deviating from my usual practice of writing in an impersonal manner, I intend to discuss the subject of living, in such a way that there will be no doubt as to whose opinion is being expressed. That it is high time to talk about this subject is evidenced by the fact that in the course of my few years of experience around this campus, I have been appaled by the "don't-give-a-damn" attitude of the average student who calls himself an educated human being. Although it is true that he is receiving training in a certain field, he certainly has no right to consider himself educated until he has learned—and practiced—at least some of the rudimentary principles of decent living.

Believe it or not, gentlemen, whether your specific endeavor is conducted in the business world, in the game of politics, or in the field of engineering, you are still mainly concerned with the business of living. Now this term is admittedly broad, but in my own definition it means that if you consider yourself a Christian—if your philosophy embraces a continuity or divine purpose of all life—you can't possibly sit through your life in the apathetic fashion of the average student here and feel that you are contributing anything worth while to anyone, least of all yourself.

It certainly looks to me as if there is a crying need for each of us to devote a portion of our lives to the improvement and benefit of other people. When we fail in this task, we not only become hypocrites in the eyes of our own philosophy, but also contribute to a world seemingly bent on self-destruction.

Many of you will temporarily ease your conscience by rationalizing that you are too busy studying right now to divert any of your energy into other channels. After spending three or four years in procrastination, you will educate yourself negatively to the extent that when you graduate and go to work you will argue that you are still too busy to help anyone else. Only by positive action started right now in school can you become positively educated. It is probably a little redundant to add here, a frequently expressed idea, that only by contributing unselfishly of your own efforts are you able to educate and improve yourself.

In the last issue of the *Technograph* was printed an announcement of the "Buck" Knight Trophy competition which was to be held on January 13. Less than two weeks before the event, designed to provide an entertaining and relaxing evening, the men who had devoted their efforts towards its reactivation were forced to cancel the affair just because of lack of interest.

The Illinois *Technograph,* the one extra-curricular activity designed specifically for engineers, has an amazingly low percentage of subscribers among the student engineers. In addition, it has frequently been forced to operate with a skeleton staff simply because the student was not interested.

Gentlemen, I believe the time has arrived for a sharp word of caution. In order to maintain the proper perspective towards life it is absolutely essential to lean back in your chair, take ten slow breaths, and re-evaluate your own philosophy. If, after you've done this, you still aren't interested in helping to participate in those activities which make campus life a little more enjoyable and pleasant for everyone, then you may as well go home; you're wasting your money. If enough engineering students come up with the same disinterest, then we may as well quit publishing the *Technograph,* fold up the Engineering Council, and disband the societies. Before you decide too conclusively in favor of the selfish, complacent attitude, however, I should like to remind you, as if anyone needed reminding, that "War is Hell!"

"Our American concept of radio is that it is of the people and for the people."

Freedom to LISTEN – Freedom to LOOK

As the world grows smaller, the question of international communications and world understanding grows larger. The most important phase of this problem is *Freedom to Listen* and *Freedom to Look*—for all peoples of the world.

Radio, by its very nature, is a medium of mass communication; it is a carrier of intelligence. It delivers ideas with an impact that is powerful . . . Its essence is freedom—liberty of thought and of speech.

Radio should make a prisoner of no man and it should make no man its slave. No one should be forced to listen and no one compelled to refrain from listening. Always and everywhere, it should be the prerogative of every listener to turn his receiver on or off, of his own free will.

The principle of *Freedom to Listen* should be established for all peoples without restriction or fear. This is as important as *Freedom of Speech* and *Freedom of the Press.*

Television is on the way and moving steadily forward. Television fires the imagination, and the day is foreseen when we shall look around the earth from city to city, and nation to nation, as easily as we now listen to global broadcasts. Therefore, *Freedom to Look* is as important as *Freedom to Listen,* for the combination of these will be the radio of the future.

The "Voice of Peace" must speak around this planet and be heard by all people everywhere, no matter what their race, or creed, or political philosophies.*

David Sarnoff

President and Chairman of the Board,
Radio Corporation of America.

**Excerpts from an address before the United States National Commission for UNESCO.*

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FREEDOM IS EVERYBODY'S BUSINESS

ARGONNE . . .

(Continued from Page 9)

Dean O. W. Eshbach—Northwestern university
Chancellor R. G. Gustavson—University of Nebraska
Chancellor A. H. Compton—Washington university
Professor F. W. Loomis—University of Illinois
Dean J. A. Tate — University of Minnesota.
Professor F. H. Spedding — Iowa State college

Dr. Paul Klopsteg of Northwestern university and Dr. L. A. Turner of the University of Iowa were selected to replace Dean Eshbach and Chancellor Compton on July 1, 1947. The director is assisted by Dr. Norman Hilberry and Dr. Harvard L. Hull, associate directors. Dr. W. M. Manning is director of the chemistry division. The director and the scientific staff of the Laboratory have full responsibility for the formulation of the research program.

The scientific staff is made up of regular and temporary staff members. Temporary members fall into two categories; the first includes those who are on leave of absence from their institutions and are on the full-time staff of the Laboratory for the duration of their leave. These members will be engaged upon research programs sponsored by the Laboratory or being carried out at the suggestion of the government. The second category includes those members who are carrying on research programs for their own institutions but make effective use of the facilities available at the Laboratory.

Temporary staff membership is not limited to the staff members of the participating institutions. The director may appoint any qualified scientist to this position. The Laboratory may cooperate with other institutions by making special facilities available for investigations at the Argonne National Laboratory, by providing special materials for use at the participating institutions, by advice and assistance in the construction of special apparatus, or occasionally by the loan of special materials authorized by the government.

Security requirements at the Laboratory are in accord with government policy. Reports detailing the results of research investigations are made available to other government laboratories and contractors working under its sponsorship in the same field. Any member of the staff is at liberty to publish results properly certified by the A.E.C. as unclassified in any accepted scientific journal and in such form as such journals may require.

Rather than the usual Civil Service wage scale on projects under govern ment sponsorship, industrial wage scale are followed thereby making some pos tions open to research men unusuall attractive.

ANL Research Projects

The research programs of the Labora tory include both fundamental researc and development work. Work in nuclea physics and chemistry and in relate phases of the physical, biological an engineering sciences is stressed.

It is intended that the research pro gram emphasize the training of scientif personnel. Botanists, biologists, chemist engineers, physicians, and physicists wor independently and in groups. In man cases, training there will constitute prin cipally a stepping-stone from college t industry. Aside from on-the-spot trai ing there are already being given lectur classes on underlying phases of both th research and applications elements o many departments. University graduate who have shown promise of finding o actually have found methods of approac to problems that are not easily solve by conventional methods are in grea demand by the Laboratory.

The research program includes stud of the properties of elements and o atomic nuclei and radiations; of fissio products and their separation; of th

(Continued on Page 24)

ENGINEERS

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Brilliant British satire_____May 19, 20, 21, 22

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DANCE DRAMA
A story heightened by the dance form_Apr. 2, 3

ORIGINAL SCRIPTS
Directed by graduate students_____Apr. 23, 24

SCENES FROM PLAYS
Directed by undergraduate students__May 4, 5

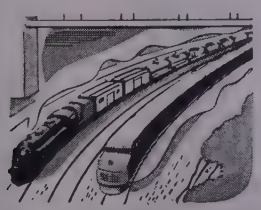
We're not so hot on POGO STICKS

Lots of people like to play jack rabbit. Still, as a way of going to work every morning, we don't see much of a future for Pogo Sticks. Not even *aluminum* Pogo Sticks.

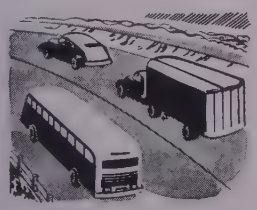
But mention any other means of locomotion or transportation and our aluminum "Imagineers" get a gleam in their eyes. After all, what is more logical than vehicles made of aluminum? Less weight to move. More payload.

We turned our imagination loose on that idea years ago . . . then engineered our thinking into trains, trucks, planes, ships. Alcoa's Development Division has a staff of "Imagineers" who think of nothing else but better ways to transport people, products, and materials by using aluminum. Actually, we have *four separate* staffs of transportation engineers, one each on railroads, highway vehicles, ships and aircraft.

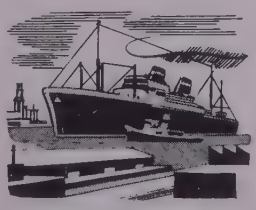
Whatever you do after college, you'll benefit from that. If you go into transportation, these Alcoa engineers will be working with you to cut costs, speed schedules, improve facilities. Or if you choose some field of production, they'll be helping to transport your materials and finished goods cheaper and faster. ALUMINUM COMPANY OF AMERICA, Gulf Building, Pittsburgh 19, Pennsylvania.



Passenger streamliners, refrigerator cars, hopper cars and tank cars built of Alcoa Aluminum are serving American railroads.



Alcoa Aluminum is finding more and more uses in buses, trucks and trailers. Yes, in passenger car manufacture, too.



Newest thing in shipbuilding is the aluminum superstructure, developed by Alcoa with marine architects and engineers.

Ever since Kitty Hawk, Alcoa has worked with the aircraft industry in developing better aluminum for better planes.

ALCOA FIRST IN ALUMINUM

ARGONNE . . .

(Continued from Page 22)

effects of neutrons and radiations on the properties of material and of living organisms; of the application of radioactive isotopes and tracer techniques to the study of biological processes, of chemical reactions, of metallurgical phenomena, and industrial processes. The metallurgy of uranium itself, so little studied before the war that not even the melting point of metallic uranium was known with any precision, is now well understood and its constants precisely found.

The use of tracers are now being used in the study of photosynthesis for the ultimate goal of actual food synthesis by laboratory methods, and of cancer for the eventual control of malignant diseases. Specifically, good results have already been obtained by using newly-discovered materials which are sold by the Isotopes Branch of the Atomic Energy Commission at Oak Ridge, Tennessee. Two materials in addition to the radioisotopes are being allocated under stringent rules to research laboratories: Heavy water — also a tracer but more useful in regard to organic matter; and boron 10 — used in the manufacture of radiation detection instruments. These are not radioactive.

University of Illinois personnel active in Argonne National Laboratory work are Dr. Moritz Goldhaber, of the physics department, who is in charge of the neutron physics research group, Professor Eugene Rabinowitch, of the botany department, who is an expert in the field of photosynthesis and now is editor of the "Bulletin of the Atomic Scientists", and Harry Palevsky of the physics department, associated with instrument development.

An example of a recent press release to industry on an advance in basic research illustrates the cooperative trend actively employed among all the national laboratories. "Dr. Inghram, Mr. Hess and Mr. Hayden of the Argonne National Laboratory have discovered that a faint isotope of an unusual type occurs naturally in the rare earth element lanthanum. Its nucleus contains 57 protons and 81 neutrons, both odd numbers. Only two such stable nuclei are known, in lithium and nitrogen; two others occur in nature but are radioactive. The new isotope appears to be stable. About one-tenth of one percent of the nuclei of lanthanum are of this type, the great majority having 57 protons and 82 neutrons."

Another central theme at Argonne is the design of atomic piles — at a level somewhat more fundamental than the engineering approach involved in G. E.'s power-production program at Knolls laboratory in Schenectady, New York. A staff of about 25 scientists here and over 30 scientists and engineers at Clinton laboratory are at present engaged in this study.

The big problem today is to work out the features of piles which run hot enough to produce electric power economically. That calls for temperatures in the neighborhood of the 900-degree level of modern steam plants. This is a considerable jump from the six now in existence which run hardly more than warm, either because, like the two research piles at Chicago, they have low energy output; or because, as at Hanford, Washington, they are elaborately cooled. Along with this program Argonne has done considerable work on the design of electronic counters, so necessary at every stage of the synthesis and transformation of radioactive materials.

As now conceived, atomic energy merely substitutes an atomic pile for a conventional steam plant in developing heat required to generate power. But atomic energy itself is an electrical force. Some day a means may be found to harness this force directly, instead of using it to generate heat which must be reconverted into power.

Before the conclusion of this article the newly formed Atomic Club should

(Continued on Page 26)

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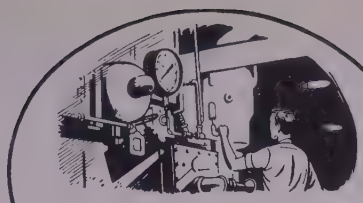
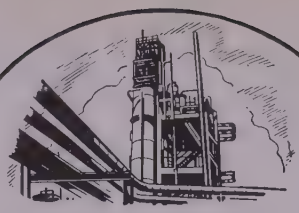
Basic Chemical Research—
Physical chemistry, organic chemistry and bio-chemistry.



Chemical Engineering—
Product and process development through pilot plant and plant scale.



Equipment Engineering—
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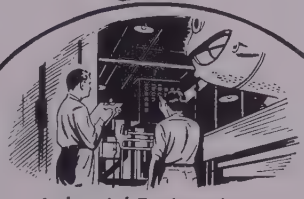

Industrial Engineering—
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ARGONNE . . .

(Continued from Page 24)

be mentioned. It is undoubtedly the most expensive and most exclusive club in the world. The idea was inaugurated by Chancellor Robert M. Hutchins last year and approved by the University of Chicago board of trustees. Membership is limited to 50 industrial organizations interested in research in atomic power. The dues? They are $50,000 a year. To date, five members have joined, all oil companies.

This is the saga of ANL. Some of the results will be significant and valuable to the military, some of value in connection with national defense, but no weapon development work will be carried on at the Argonne National Laboratory. If a satisfactory control of atomic energy can be achieved, unprecedented constructive advance in biology, chemistry, physics, and medicine will eventually be credited to the Argonne National Laboratory.

Daffynition: An electron is a dot of electricity that speeds very fast backwards from the direction that electricity actually goes.

* * *

Webster says taut means tight. There are plenty of people who have been taut quite a bit in college.

JOE COOK . . .

(Continued from Page 16)

Let us start with Joe's freshman year on campus, 1941. At that time Joe co-captained the freshman wrestling team and won his numerals. To prove untrue the old adage about athletes not being scholars, wrestler Cook made the Honors day celebration with his 4.5 average.

During his sophomore year Joe received one hour of B. This has been the only grade below A that he has ever received since.

Joe's college career was interrupted in February of 1943 when he enlisted in the army air corps. One incident that stands out in his memory is the celebration of the Fourth of July on a ship just off the coast of England. On October 7, 1944, Joe was shot down over Kassel, Germany, and spent the remainder of the war in a prison camp a little north of Berlin.

While in camp he won a $100 bet by walking 100 miles in five days, on a tract he laid off in the enclosure.

January of 1946 found Joe back on the Illinois campus, again bringing down top grades. This fall Joe was presented with the Interfraternity Scholarship cup which is awarded each semester to the fraternity man who turns in the greatest number of A's.

As an extracurricular activity he spends a considerable amount of h time with the University chess clu "To improve game techniques," he playing twelve correspondence games once.

Joe is an active member of Acaci fraternity, and for several semesters h served as chapter reporter for Acacia national magazine. The 1946 Bronz Tablet contains Joe's name and he als holds the scholarship key given for mak ing Honors day for three consecutiv years.

In June, Joe will receive his ma ter's degree in mathematics. For th reason that he needs "the tools of th trade."

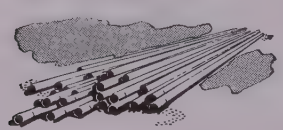
After completing his education, Jo plans to devote his time to pure researc He is not interested in industrial re search, but would be interested in alig ing himself with a university.

And then there was the girl who wa so lazy she wouldn't even exercise di cretion.

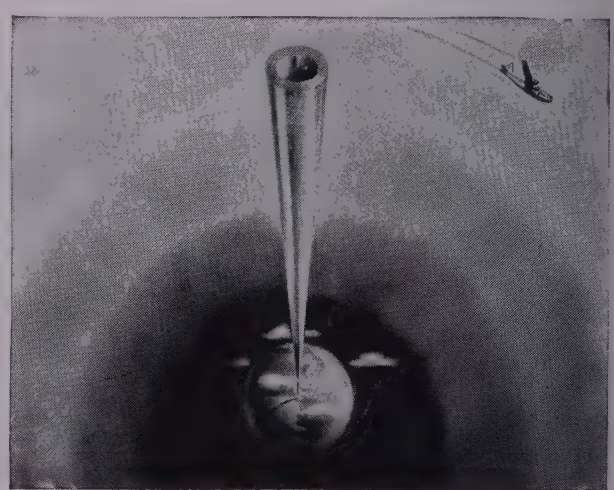
* * *

Barrister (for motor accident vi tim): Gentlemen of the jury, the drive of the car stated he was going only fou miles an hour. Think of it! The lon agony of my poor, unfortunate clien the victim, as the car drove slowly ove his body.

Pipe line . . .



to the Stratosphere



Up in a stratosphere plane you'd breathe oxygen from a tank . . . oxygen extracted from liquefied air. Processing equipment in which the extraction takes place calls for something extraordinary in the way of tubing.

Ordinary steel tubes get hazardously brittle in the 315-below-zero temperature the extraction process demands—crack like a crisp carrot. Better, safer, tubes were needed. Industry got them—from B&W—tubes made of new nickel-alloy steels.

B&W calls these new tubes Nicloys. In refrigeration, in making synthetic rubber, in handling natural gas and strongly corrosive crude oils, in paper mills, industry is finding that Nicloy tubes answer many tough problems.

Development of Nicloy tubing is another manifestation that, for all its years, B&W has never lost the habit of having new ideas for all industries.

To technical graduates, B&W offers excellent career opportunities in diversified phases of manufacturing, engineering, research, and sales.

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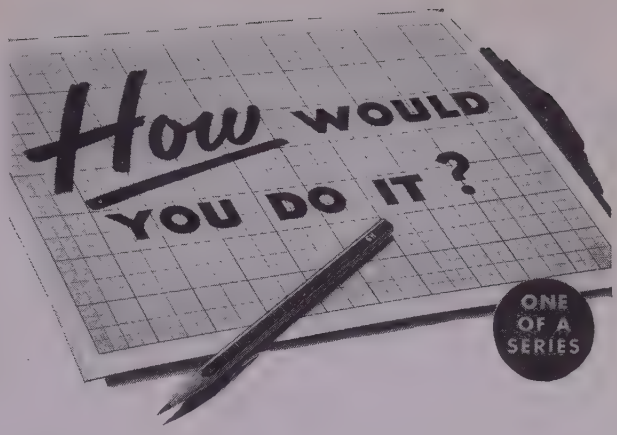

PROBLEM—You are designing an electric clock for automobiles. The clock itself is completed. To set the clock, the spindle which turns the hands must be pushed in against a spring pressure and then turned—and, of course, when the clock is installed, this spindle is back under the dashboard. You want to provide a means for pushing and turning the spindle from a point that is easy to get at. How would you do it?

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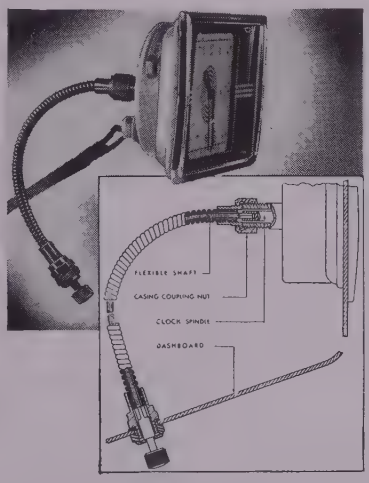

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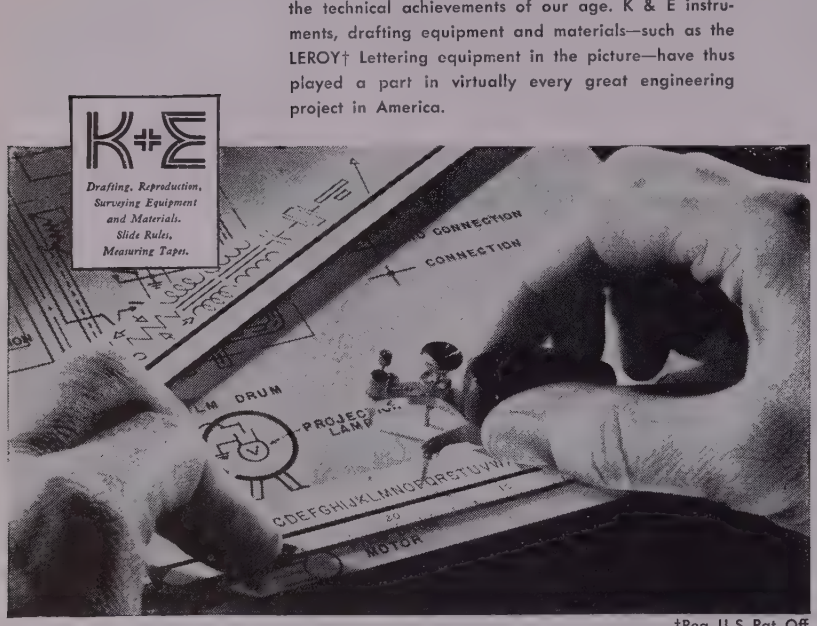

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SOCIETIES . . .

(Continued from Page 18)

John Prodan, Robert N. Rasmus, Bill C. Reed, John G. Replinger, Leslie E Roby, Earl G. Ruesch, Donald K Schaeve, Robert K. Scharmer, Robe C. Schneider, Fred L. Siegrist, Charle W. Studt, Robert J. Wagner, Harla V. White, William C. Wiley, Richar D. Williamson, Robert S. Wisema and George S. Ziles.

William A. Brooks, Gilbert C Kamm, and Jack L. Pihl were electe as honor students.

PI TAU SIGMA

On Thursday evening, December 1 Alpha chapter of Pi Tau Sigma ente

tained prospective pledges a a smoker held at Hille foundation. Professor D. C Ryan outlined the early his tory of the organizatio which was founded at Ill nois in 1915.

President Joe Mazer wa in charge of the meeting.

SIGMA TAU

Sigma Tau held a pledge smoker o Thursday, January 9. Initiation wa held during the week preceding fina and was climaxed by an initiation ba quet held at the Inman hotel.

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DU PONT Digest
For Students of Science and Engineering

Rubber accelerators lead the way to new agricultural fungicides

Vulcanization accelerators for rubber and agricultural fungicides would seem to have little in common. But the wide variety of interests of men in the Du Pont organization sometimes result in outstanding developments from such apparently unrelated products.

A rubber chemist suggested to a plant pathologist that derivatives of dithiocarbamic acid, NH_2-C(S)SH, parent substance of a well-known group of rubber accelerators, be tested as insecticides. His suggestion was based on the possibility that sulfur combined in this form might be more effective than free sulfur, a recognized insecticide.

Entomologists and plant pathologists investigated the fungicidal as well as the insecticidal properties of this group. One of the first compounds tested, sodium dimethyldithiocarbamate, $(CH_3)_2$N-C(S)SNa, even in dilutions of 1:30,000, was found to be a powerful fungicide, but somewhat injurious to plant life.

This led to a systematic program of research including other metallic salts, the ethyl, propyl, butyl, phenyl, and other aryl derivatives of the dithiocarbamates and thiuram mono- and disulfides, and the related compounds made from ethylenediamine and morpholine. In this phase of the work, organic chemists played an important role by suggesting various derivatives and preparing them for tests. Later, in cases where proper dispersion and adherence of the compounds to plants were important, the skill of physical chemists was called upon.

In general, the compounds of greater chemical stability were found to be less effective. Fungicidal efficiency diminished with increase in size of alkyl radical, and as aryl radicals were substituted for alkyl. Thus the unusual situation developed that with the exception of the bisethylene (dithiocarbamates), the first and simplest products tested, the methyl derivatives, proved to be the best fungicides.

Iron and zinc dimethyldithiocarbamates, $(CH_3)_2$NC(S)-S-M-S-(S)C N $(CH_3)_2$, are now sold as "Fermate" fungicide and "Zerlate" fungicide respectively, for control of fungous diseases of many fruit and vegetable crops, tobacco, flowers and other ornamentals. Zinc ethylenebis(dithiocarbamate), Zn(-SC(S)NHCH_2CH_2NH(S)CS-), marketed as "Parzate" fungicide, has specific action in the control of late blight on potatoes and tomatoes. Tetramethylthiuram disulfide, $(CH_3)_2$NC (S)-S-S-C(S)N$(CH_3)_2$, is used in two compositions, as "Arasan" disinfectant for seeds and "Tersan" fungicide for turf diseases.

Overall, the derivatives of these groups of compounds proved to be outstanding as fungicides, rather than as insecticides. Although a marked degree of specificity for different pests was characteristic of the members of this series, it is interesting to note that all three were highly effective. This work offers still another example of how the breadth of interest in a company like Du Pont can lead to worthwhile developments.

Field testing of promising fungicides, including "Parzate" formulations, for control of tomato late blight.

B. L. Richards, Jr. Ph.D., Cornell '44, and A. H. Goddin, M.S., University of West Virginia '32, test efficiency of "Parzate" fungicide in control of tomato late blight and bean rust. Equipment is specially designed laboratory spray chamber.

Questions College Men ask about working with Du Pont

What are the opportunities for research men?

Men qualified for fundamental or applied research are offered unusual opportunities in facilities and funds. Investigations in the fields of organic, inorganic and physical chemistry, biology, parasitology, plant pathology and engineering suggest the wide range of activities. Write for booklet, "The Du Pont Company and the College Graduate," 2521-A Nemours Building, Wilmington 98, Delaware.

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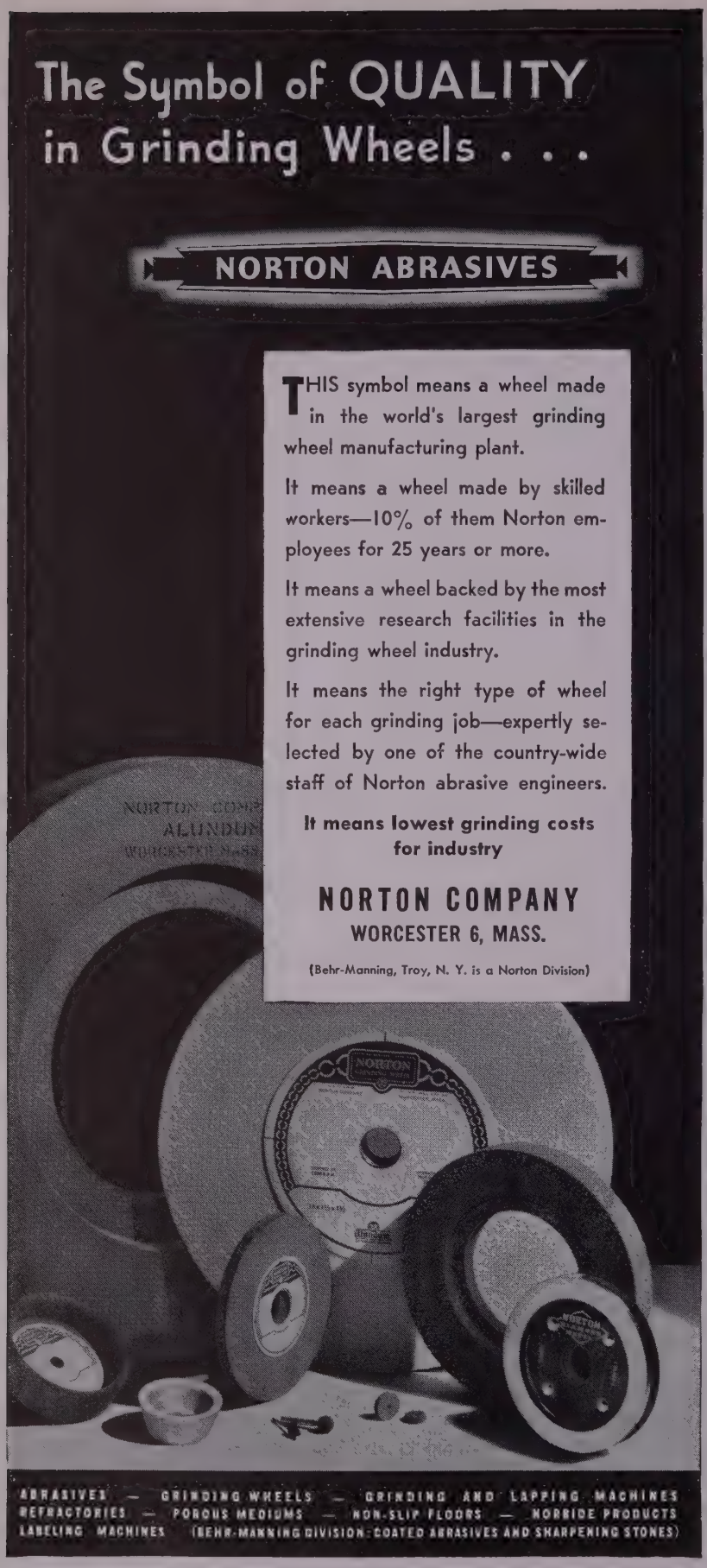
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LABELING MACHINES (BEHR-MANNING DIVISION: COATED ABRASIVES AND SHARPENING STONES)

PATENTS . . .

(Continued from Page 11)

for this is that only he can gain entry to the records of the patent office and thus verify whether or not there are already prior claims registered which would prevent your being granted a patent.

In order for the attorney to do this background work, he will have to go to Washington, and you will be paying the bill. This is a good thing to remember so that you will not be bothering either the patent office or an attorney unless you honestly believe that you have something worthwhile.

After your attorney has returned from Washington and reported to you that he believes that there is a very good chance that the patent can be obtained, your work will really begin.

The patent application must be submitted upon special patent paper which can be obtained from the patent office or the government printing office. There is also a particular technique by which the drawings must be made. Usually it will be wisest to let the attorney take care of the drawings as they usually have in their employ men who have been making patent application drawings for years.

Twenty Claims Free

When you submit your application you will have to make certain claims for your invention. The patent office will allow you to make twenty claims free. If you wish to make more than twenty claims, it will cost you $1 per claim.

These claims must be very carefully drawn and must be worded in the peculiar language which is a part of the standardized patent procedure. Here again the attorney, whom you have retained, will prove his worth.

Any series of claims must be, ultimately, the basis upon which the patent will be granted. Let us suppose that you fail to recognize one very valuable ability of your invention. Under these circumstances, another person can enter a claim on your patent and thereby make use of your patented invention due to your own carelessness or negligence. At the time when the claims are being prepared, the very greatest care should be taken to make sure that all of the possible applications of the invention have been investigated and fully discussed.

In your patent application you must state who you are, your age, place of birth, and nationality. Failure to give complete and truthful answers to these questions will ultimately result in revocation of your patent rights.

At the time that the application is filed, it is sometimes necessary to submit either a full sized specimen of the

(Continued on Page 32)

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PATENTS . . .

(Continued from Page 30)

item or, in the event that this is inadvisable due to size, a working model. Great care should be exercised in the construction of the model so that it will exactly conform to the specifications as set forth in the patent application.

Many an inventor has been able to bring his invention up to the point where he needs financial backing in order to be able to pay attorney fees and finally to start manufacturing the item. This is always a difficult problem as the people who are willing to give financial backing to inventors are few and far between. Usually, the person with money must first be convinced of the worth of the invention and then he will usually want to obtain a controlling interest in the invention in return for his financial aid. This seems rather unfair but it is the usual practice. The only thing that can be said is that it very definitely behooves the inventor to attempt to do business, if at all possible, with a man whose integrity is beyond question.

Following are a few of the standard fees which are charged by the patent office and which are payable in advance:

On filing each original application	$30.00
Each claim over 20	1.00
On issuing each original patent	30.00
On issuing each claim over 20	1.00

These are the most important and most often encountered fees but there are many more ranging from 10 cents for certified copies of patents to $1.50 per hour for assistance to attorneys on the examination of publications and materials in the scientific library of the patent office.

After all of the necessary papers and drawings have been prepared they are sent to the commissioner of patents, at the patent office. This is known as filing an application for patent.

Sometime following the receipt of the application, the patent office will make an examination of the prior patent grants and will decide whether or not, in its opinion, the inventor is entitled to a patent.

Should the patent office decide that your invention is not patentable, they will inform you of their reasons for so believing. Following receipt of this letter, you, the inventor, or your attorney have six months in which to ask for a hearing at which time you or he can personally argue the case.

The average length of time required to procure a patent runs well over two years, and therefore it is advisable that the inventor have some other means o support in the interim. The cause fo this delay is the tremendous amount o research work which must be done b the staff of the patent office in connec tion with each and every patent appli cation.

The manner in which the applicatio is examined is quite thorough. The ap plication division determines: a) wheth er or not the application is complete b) whether or not the proper paten office procedure has been folowed; an c) to which class of inventions the ap plication belongs. The examination divi sion reviews the application to deter mine: a) whether the subject of th application is patentable under the law of the United States; b) whether th item meets the basic requirements o eligibility; and c) whether the appli cation conflicts with any patent that ha already been granted or is pending.

It might be well, in passing, to not that the patent office receives on an aver age about 1,200 patent applications pe week. Under these circumstances it i easy to understand why there is such a great delay in the processing and grant ing of patents.

If, and when your patent has bee granted, you will be so notified by th commissioner of patents. Upon receip

(Continued on Page 34)

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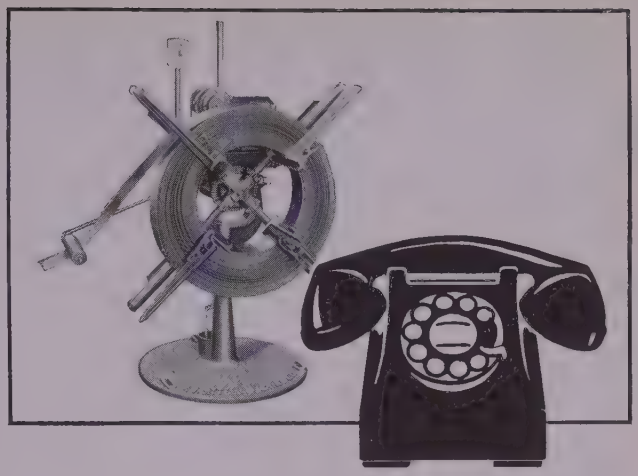

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PATENTS . . .

(Continued from Page 32)

of this information, you will possess certain rights as to tax exemptions upon your invention, and other legal items, which will not be discussed here. However, it would be a very wise move for you to make yourself acquainted with the purely legal aspects of your rights and obligations as owner of a patent. At such a time, unless your patent attorney is also an attorney-at-law, it would be adviseable to avail yourself of the services of a good lawyer so that you may enjoy the rewards of your inventive ability.

"An engineer got pretty fresh with me last night."

"Did you get the upper hand?"

"Yes, but I couldn't do a thing with the one on my knee."

* * *

Patient (Coming out from under the ether): "Doctor! Why are the blinds drawn?"

Doctor: "There is a big fire next door, and I didn't want you to come to and think that the operation wasn't successful!"

* * *

Barmaid: "Oh yes, I married a man in the village fire department."

Soldier: "A volunteer?"

Barmaid: "Nope, shotgun."

JAPAN . . .

(Continued from Page 10)

little contact with the universities, in direct contrast to American organizations of a similar nature, few of the Japanese industrial research men have advanced degrees. The students with advanced training seem to feel there is a stigma attached to this type of work. The situation resembles that which existed in the United States prior to 1918. In addition to this handicap, most of the industrial laboratories operate in secrecy because the present patent laws do not guarantee them control over the fruits of their labors.

With regard to world trade, Japan at present is in no condition to resume immediately her former place. Her exports and imports are far below those of prewar years. Manufacturing establishments of all kinds have been damaged to varying degrees. Imports of food, fuel, fertilizer, and raw materials have shrunk extensively, and exports of manufactured goods have declined proportionately. Agriculture alone remains substantially intact, but is seriously handicapped by a shortage of fertilizer. These conditions have brought about the inevitable result, a lower standard of living in terms of food, clothing, shelter, and inflation.

Elevation of this standard of living will be the result of recovery and reconstruction. Possibly this may be brought about by increase in farm output, yiel from available fisheries, and mine an forest output. However, before the wa these home-island resources had been s skillfully exploited that a further ir crease in output could come only ver slowly. The only way to appreciabl increase the general level of living (th forcible conquest of territory failed i this respect, as it always does) will b through the development of manufactu ing industries for export and through th sales of services, as in the tourist trad and shipping.

Dr. Adams goes on to say, "It is wit reference to the recovery, reconstructio and development of the export trade i manufactured goods, and in a very wid range of these, that the progress of sc ence and technology in Japan (using th word "science" with emphasis upon th natural sciences) assumes particular im portance. The products of industry com petitively salable by any country on th world market are constantly changin both in character and in unit cost. Th most efficient nations must and do inven new products, creating new markets, an at the same time they devise cost-reduc ing processes applicable to older proc ucts."

In comparison with the products c United States and European industrie the manufactured products of Japa

(Continued on Page 36)

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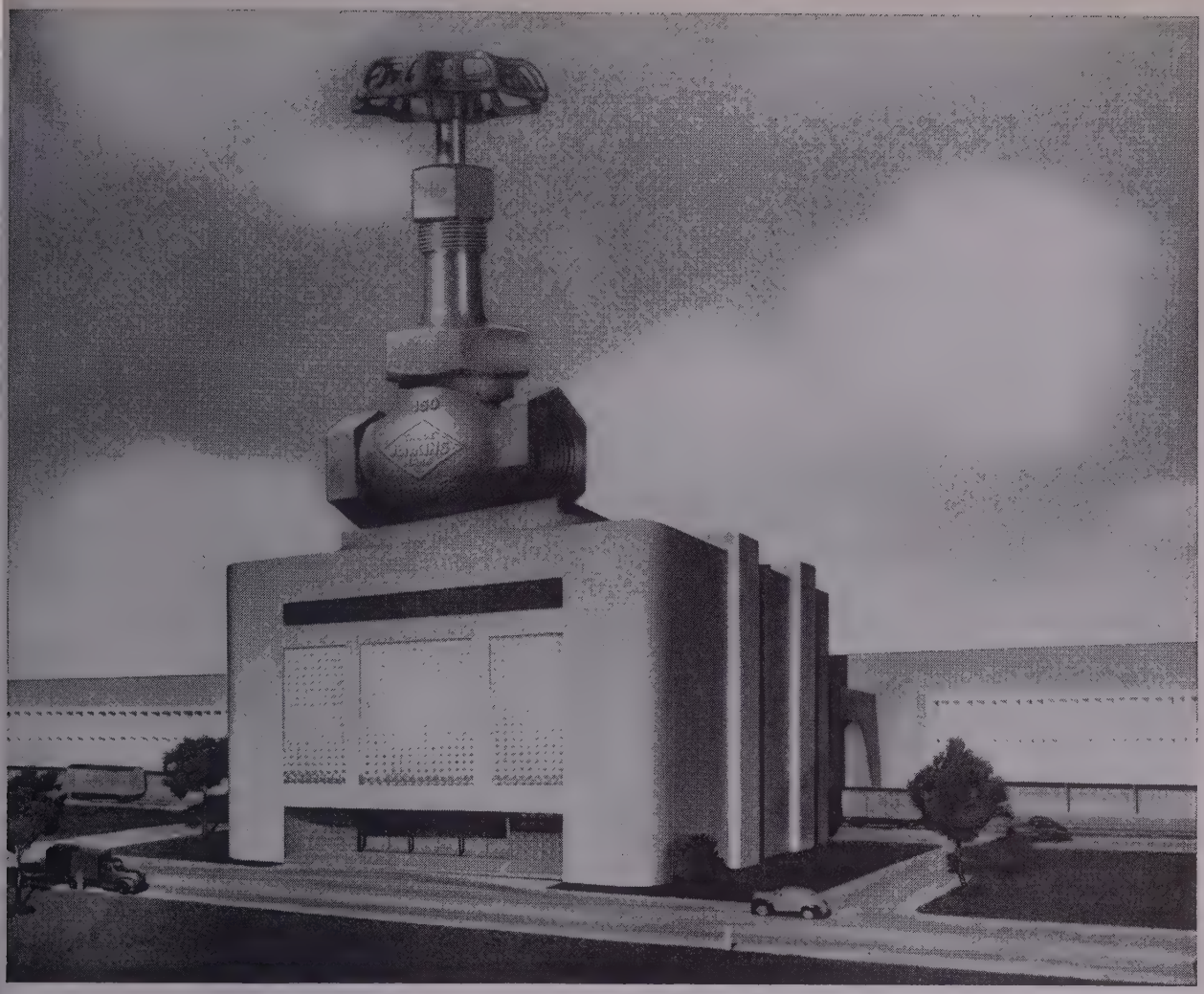

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JAPAN . . .

(Continued from Page 34)

have, in general, come to be regarded as of poor quality. The application of scientific research to their development and manufacture would bring about a better product and remove this stigma. This has not been done for several reasons. In addition to the fact that few Japanese scientists are willing to accept positions in commercial laboratories and that the patent laws contain loopholes as mentioned above, constant betterment of product was always retarded by artificial price fixing by trade associations. However, these price fixing groups have now been dissolved.

A renewal committee composed of Japanese scientists is at present working on this problem of the reorganization of Japanese administration of science and technology. The committee, composed of 108 scientists elected by scientific societies throughout Japan, was just getting under way as the Scientific Advisory Group left Japan, and it is to be hoped that an intelligent, effective reorganization on Japanese initiative will result.

The formation of more nation-wide professional or scientific societies would also aid the development of science and technology, and indeed higher education generally, in Japan. The main aim of such a society is to further the science which it represents, and does so through published matter, by bringing together for discussion different groups of scientists, and by encouraging research and thought. It gives experienced men a chance to pass on their knowledge to the inexperienced.

However, reorganization of the natural sciences should not proceed down a narrow alley at the expense of the social sciences. As Dr. Adams points out: "The reconstruction of Japan and her rehabilitation in the eyes of the world call equally for leadership and advancement of thought in the social, economic, and cultural fields, and for change in the attitude of the people as well. Material and spiritual reconstruction must move forward on a common front. Progress depends not alone upon the scientists but upon the collaboration of scientific and political leaders. Their joint efforts to visualize the new Constitution and to restore the economy of Japan will be watched throughout the world."

"Certainly I respect your advice, Mr. Bell, but what good is alimony on a cold night?"

* * *

Sign in Library: "Thinking allowed — but not aloud!"

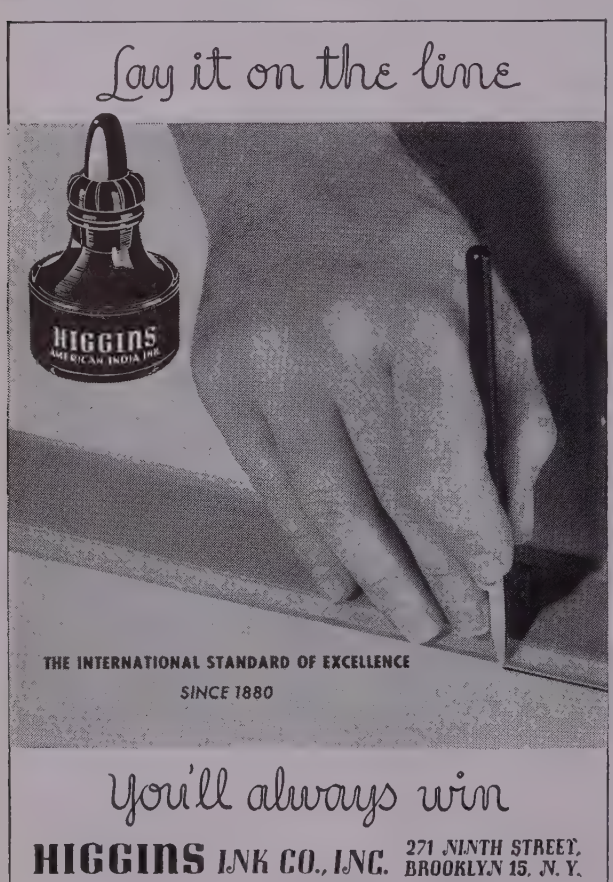
SEE THE LIGHT . . .

(Continued from Page 7)

the addition of the human figure, bu in the majority of cases more interes will usually be secured. There is some thing to this, perhaps because humar interest arouses the curiosity of thos viewing the picture. Slight movement of the model or models used in the pic ture will register as a blur so that i is best to place them leaning comfortabl against a building or rail.

The greatest dilemma occurs in nigh photography when people walk into th scene or cars drive by. Should a perso appear or an auto drive by, simply cove the lens with a dark card until the in truder is past and continue the expos ure. This can be done as often as neces sary, but with short exposures som difficulty is encountered in the timing If the camera shutter is closed at thes times there is a good chance that it ma be moved. If the setting is made a "B," or Bulb, and the shutter does no have to be cocked it may be opened an closed safely by a cable release.

The results of a successful evenin will be manifest in a negative that i of normal range that can be printed o No. 2 paper. The pleasing response o those seeing the print is the reward.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(Continued from Page 2)

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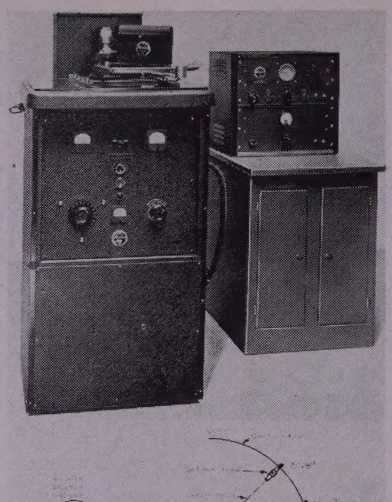
Photographs of terrain printed with the new rectifier are so sharply defined they give an almost three-dimensional effect.

Fluorescence Analysis Of Minerals

A Norelco fluorescence analysis unit which utilizes a new X-ray diffraction technique and makes possible rapid quantitative metal analysis has been announced by the North American Philips company.

It was exhibited and demonstrated for the first time at the National Metals Exposition in Chicago on October 18-24. The new unit determines quantitatively the purity of metals or the percentages of alloying components, and the quantities of metallic elements dispersed in non-metallic carriers.



Fluorescent analysis unit used for metal analysis and control

The fluorescence analysis unit consists of an x-ray generator, a rotating indexing holder for four specimens, a special collimating system, a crystal (usually sodium chloride), a goniometer having a scale graduated from 0° to 90°, and a Geiger counter. The crystal and Geiger counter are mounted on, and positioned by, arms which traverse the goniometer arc.

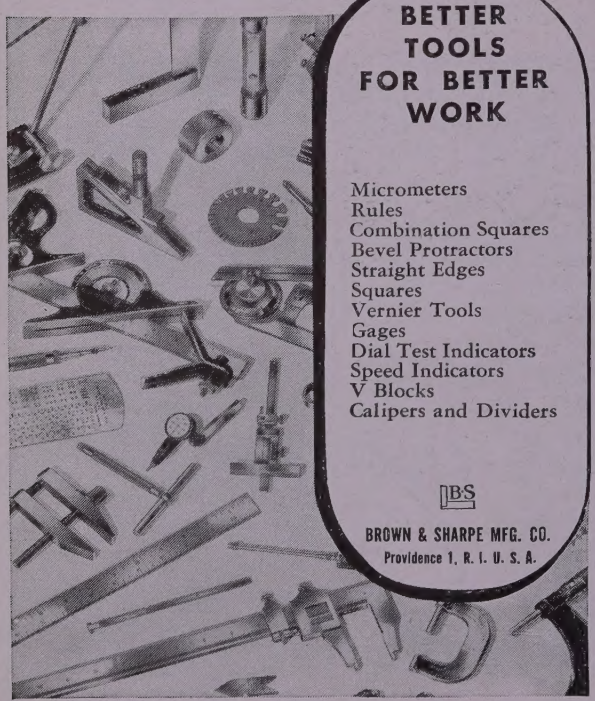
The apparatus serves for determinations on elements ranging from atomic numbers 20 to 41 when a rock salt crystal is employed. For the elements 42 to 50, a calcium fluoride crystal may be used.

The use of the apparatus is best explained by discussing a typical problem. To determine the cobalt, nickel, and chromium content of an unknown alloy, a specimen of the alloy is placed in the four-unit holder along with the standardizing specimens containing known percentages of the alloying elements.

Assume that the cobalt content of the unknown alloy is to be determined first. From tables of reflection angles in which settings for various metals are listed we find that for cobalt the Geiger counter should be set at the 36.8° mark on the goniometer scale. Next, the sodium chloride crystal position is adjusted to one-half the Geiger counter angle or 18.4°. By rotating the specimen holder readings are taken first on one or more of the cobalt standardizing samples and then on the unknown. By comparing the readings and referring to a calibration chart, the percentages of cobalt may be determined.

The technique employed with the new

(Continued on Page 40)



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Foundry modernization is a continuing project at Homestead Valve Manufacturing Company, Inc., Coraopolis, Pa., because Homestead engineers have since 1892 kept their sights set on modern productioneering equipment and methods.

And, in their research, these engineers have investigated fuels and combustion techniques as they apply to foundry practice. As a result the productive flames of GAS are increasingly important and more extensively used in Homestead's production lines.

Modern Gas-fired Foundry Equipment, such as the "SKLENAR" furnaces for ferrous metal-melting, utilize the special characteristics of GAS—flexibility, controllability, speed. This saves equipment space, melting time, and lining maintenance. Operating at 2700° F. these furnaces have a capacity of one ton heat per hour, and 160 heats per lining—evidence that modern Gas Equipment is really productioneering equipment.

But this is not the only GAS application in the manufacture of Homestead valves. Core ovens, annealing furnaces, and non-ferrous crucible furnaces are all heated by the productive flames of GAS. In modern foundry practice GAS is the logical fuel for all heating and heat-treating operations.

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NEW DEVELOPMENTS . . .

(Continued from Page 38)

fluorescence analysis unit makes available an entirely new approach to many of industry's problems of metal analysis and control. The x-ray method permits analyses to be made without destroying the specimens used for the purpose. This method also permits a rapid determination of the percentage of a component present in large or small proportions.

Gas Turbine

A British concern is now building two ships with closed cycle gas turbines as power units. This will be a new thing in the field of marine power plants. The units used will develop 6,000 shaft horsepower. Future plans call for building some units with a shaft horsepower of 50,000. These installations will take only about one-fifth as much space as equivalent steam or diesel propelling units. By using the closed cycle type of turbines, the blades and other parts will come into contact with pure air only and thereby prevent impurities from fouling the fine blades and other parts. It is expected that the units will have a life of around 100,000 hours.

Variable pitch blades will also be used, thereby eliminating the need for gear reducers and increasing the general efficiency of these plants.

ILLINI IN ACTION . . .

(Continued from Page 14)

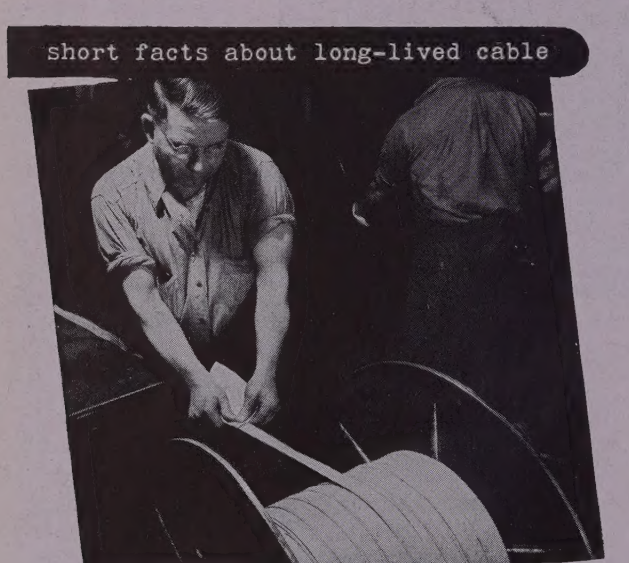
Engineers, and now is serving as chairman of the Executive Committee of this local. 6. Engaged in fraternal activities quite widely and for many years was president of the Chicago Fraternal Life association. 7. Participated in instituting the insurance activity of the Municipal Employes society in 1927. 8. Was one of the organizers and first vice president of the Municipal Employes Insurance association founded in 1937. 9. Succeeded to the presidency of the Insurance association in 1943.

Beginning September 1, hunting and fishing became the principal interests of CLEVES H. HOWELL '05, Longmont, Colorado, who has announced his retirement from a distinguished engineering career. He has been engaged for the past 10 years as project engineer of the Colorado-Big Thompson project, U. S. Bureau of Reclamation, one of the monumental feats of American engineering, and construction engineer of the Continental Divide (Alva B. Adams) tunnel. This 13-mile tunnel, the longest in the world to be built from two headings, will divert water from the western slope of the Continental Divide and Rocky Mountain National Park to the eastern slope. The Big Thompson project provides for the diversion of surplus water from headwaters of the Colorado river on the western slope of the Continental Divide to lands on the eastern slope in northeastern Colorado to supplement present inadequate irrigation supply and provide opportunities for development of hydroelectric power.

At Kagoshima on Japan's Kyushu island, Lt.-Col. RUSSELL E. McMURRAY '26 serves as military governor. A chemical engineer in civilian life, he was commander of a chemical mortar battalion on the Fifth army front in Italy, fought at Salerno and Anzio and won the Purple Heart and Silver Star. He is a native of Peoria, is married and has a daughter and two sons.

FENG C. LING '21 states: "My M. E., E.E. and C.E. courses are still most useful to me." Since the end of the war he has had charge of two railway lines in his province. He is repairing the war-damaged section of one which connects Indochina with the south.

In the reorganization of the General Electric company into integrated departments October 1, W. C. HECKMAN '20, M.E. '26, was appointed manager of the aeronautic and ordinance systems division. In his new position he will have entire charge and direction of manufacture, design, and commercial activity in this class and field of products.



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